User Manual

CAMBRIDGE ACCUSENSE

ATM2400
Multi-Channel Airflow and Temperature Instrument

degree C
DEGREE CONTROLS, INC.

50600MN000-A06

ATM2400 Instrument Series User Manual

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Prefice A: Customer Service Information

This section provides information about Degree Controls, Inc.'s Customer Service policy, installation policy, and warranty. Degree Controls, Inc.'s policies on warranty returns and consumable parts are also explained. To determine which policies apply to your system, consult Degree Controls, Inc.

A1. Customer Service Policy

Degree Controls, Inc. has established a Customer Service department to meet the service needs of its customers. A Customer Service Representative is available from 9:00 a.m. to 5:00 p.m. (EST).
For technical assistance, contact TechnicalSupport@Degree Controls, Inc.(1-877-DEGREEC):

A2. Technical Support

Telephone troubleshooting with technical experts
Technical assistance to solve specific application questions

A3. Warranty Information

Degree Controls, Inc. products purchased in the USA or Canada are warranted to be free from defects in materials or workmanship for a period of 1 Year from the date of their original purchase. If a sensor or instrument fails to perform to this warranty, we will, at our own option and at no cost to the customer, replace or repair it within a reasonable timeframe. This warranty does not cover defects, malfunction, or failures resulting from shipping or transit accidents, misuse, operation contrary to furnished instructions, modification, tampering, or normal wear and tear.

A4. Returns

Within the above period, any part of the goods that prove to be defective in material or workmanship may be repaired or replaced on an exchange basis with a new or equivalent part free of charge.

After such warranty period, any labor, travel time, transportation and subsistence expense shall be borne by the Buyer. If preferred, Buyer may return goods to Degree Controls, Inc."s manufacturing plant with shipment both ways at Buyer"s expense for repair work. Parts returned damaged due to poor or insufficient packaging by the Buyer will not be accepted for service unless otherwise agreed.

Parts returned with no manufacturing defects found, will incur a service/handling charge.

In no event shall Degree Controls, Inc. be liable for incidental or consequential damages, including, but not limited to, costs, or removal and reinstallation or such goods, good will, overhead expenses, loss of profit, and loss of use.

The remedies are available only to the original Buyer. Buyer agrees to accept billing for service expense for service call resulting from other than a Degree Controls, Inc. goods failure or other Degree Controls, Inc. fault.

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About this Manual

This User Manual provides the information necessary to obtain the maximum benefits from the Cambridge Accusense Brand ATM2400 Instrument Series. All operating instructions, functional descriptions, illustrations, and other relevant information are contained in this manual. Descriptions of the system hardware and user-interface operating software are included. You will also find the theory of operation for the instruments and sensors they employ. Systematic instructions guide you through all installation procedures, and tables identify and describe all software operating menus.

Starting Out

If you are placing your ATM2400 in service for the first time, Degree Controls, Inc. recommends working through this Manual following the step-by-step instructions provided. If you need additional help at your site as you move through these procedures, contact your regional Degree Controls, Inc. representative or Degree Controls, Inc."s Technical Support for assistance in properly installing and starting up your ATM2400 Series instrument(s).

Operator Assistance:

If you experience difficulty in running your ATM2400 Series instrument, sensors or software, please contact your Degree Controls, Inc. Representative or Degree Controls, Inc. Tech Support. This Manual includes a "Frequently Asked Questions" list that discusses many common system problems, possible causes, and corrective operator actions. The information given there is general.

Degree Controls, Inc."s Customer Service is available weekdays from 9:00 AM to 5:00 PM Eastern Time. Please contact Degree Controls, Inc. Tech Support at ***1-877-DEGREEC*** or visit our website www.degreec.C.com for additional information.
Technical assistance is also available from Degree Controls, Inc. Sales Representatives and Distributors throughout the world. Please check our web site for the representative or distributor in your area.

Design Change Notice

Due to design changes and product improvements, information in this manual is subject to change without notice. Degree Controls, Inc. reserves the right to change hardware and/or software design at any time, which can affect the contents of this manual.
Degree Controls, Inc. assumes no responsibility for errors of omission or content in this manual. We will make every reasonable effort to ensure that this user manual is up to date and corresponds with your shipped instrument(s) and sensors.

Types of Messages

NOTES, **WARNINGS** and **CAUTIONS*:***

Below are important notices and safety instructions. Please read carefully, and follow all warnings and instructions marked on the sensor and in this manual.

DANGER: INDICATES SITUATIONS THAT COULD RESULT IN THE INJURY OR DEATH OF A HUMAN OPERATOR OR BYSTANDER. WARNINGS ARE PRINTED IN ALL UPPER CASE CHARACTERS IN BOLDBACE TYPE BETWEEN TWO HEAVY HORIZONTAL RULES, AS IN THE FOLLOWING EXAMPLE:

DANGER: FAILURE TO PROPERLY GROUND THE INSTRUMENT MAY RESULT IN ELECTROCUTION OR SEVERE INJURY TO THE OPERATOR.

CAUTION: Indicates situations that could damage the Instrument and/or Sensors, or cause injury to an operator. Cautions are printed in mixed upper- and lower-case characters in boldface type, between two heavy horizontal rules, as in this example:

CAUTION: Failure to connect the instrument to the proper electrical voltage as specified herein could result in damage to the power supply and instrument.

NOTES: Indicate miscellaneous information. Notes are printed in mixed case characters, in normal type, between two heavy horizontal rules, as in this example:

NOTE: For details on Degree Controls, Inc. customer service policies, refer to Preface A.

Dangers,Cautions, and Notes

Below are important safety instructions. Please read carefully, and follow all warnings and instructions.

DANGER; NEVER INSTALL OR OPERATE DEGREE CONTROLS, INC. INSTRUMENTS AND SENSORS WHILE IN CONTACT WITH WATER. YOU MAY BE ELECTROCUTED!

DANGER: DO NOT TRY TO REPAIR AN INSTRUMENT OR SENSOR YOURSELF. THERE ARE NO CUSTOMER-SERVICEABLE PARTS INSIDE. OPENING THE CASE PRESENTS A DANGER OF ELECTRIC SHOCK, AND VOIDS THE DEGREE CONTROLS, INC. WARRANTY.

DANGER: IF ANY OF THE FOLLOWING CONDITIONS OCCURS, TURN OFF THE INSTRUMENT IMMEDIATELY, UNPLUG THE POWER CORD FROM THE ELECTRICAL OUTLET, AND CONTACT DEGREE CONTROLS, INC.:

If smoke, abnormal noise, or any strange odor is present.

If liquid has been spilled over or into the instrument.

If the instrument has been dropped or damage is visible.

WHEN EXPERIENCING MALFUNCTIONS,CONTINUING TO USE INSTRUMENTS OR SENSORS IN THE EVENT OF ANY OF THE ABOVE CONDITIONS CAN RESULT IN DAMAGE TO THE EQUIPMENT AND INJURY TO HUMAN OPERATORS!

CAUTION: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

CAUTION: Avoid exposing the Instrument and sensors to dust, rain, and (condensing) water. Water can cause shorts, corrosion, and, at a minimum, inaccurate readings.

CAUTION: Use a power cable that is properly grounded. Always use AC power cords that meet the local safety standards, such as those listed below.

CAUTION: The ATM2400 and Sensors are ESD sensitive devices. When shipped, the units are packaged in ESD safe bags. The instrument and sensors should be returned to their respective ESD safe bags when they are placed back into the carrying case.

CAUTION: The ATM2400 Series Instruments and Sensors are designed for room air velocity and room temperature measurement only. Air containing chemicals (for example, hazardous gases) may damage the UAS sensor head. Note: Chemicals may change the heat capacity of the air so that the calibration of the UAS sensor is no longer accurate.

NOTE: Avoid exposing the Instrument to direct sunlight or other heat sources. Do not store the equipment in an extreme hot or cold environment.

NOTE: Keep the Instrument and Sensors away from magnets, motors, transformers, speakers, and televisions.

1. ATM2400 Series Instruments

1.1 General Description

The Cambridge Accusense ATM2400 Instrument Series is a family of sophisticated, self-contained instruments designed for accurate, cost-effective multi-point evaluation of air velocity and air temperature measurements. Simultaneous, real-time data collection is supported for many sensors at once.

The ATM2400 Series is designed for laboratory applications. It can take measurements much more quickly than conventional, single-point measuring instruments.

The ATM2400 Series embodies the proven accuracy, reliability, and versatility that are characteristic of Cambridge Accusense systems. Frequent returns and field recalibration are not required, because the user can easily verify operation and accuracy of any one sensor (and its channel) by comparing it against any other sensors (and their channels). The ATM2400 does not require calibration, however, it is recommended that Sensors be calibrated annually.

1.2 Applications

The ATM2400 is a stand alone USB Hub that interfaces with Cambridge Accusense airflow & air temperature sensors. Each ATM2400 can accept up to 36 sensors simultaneously.
The ATM2400 can be used in a wide range of applications and industries. Some examples follow:

- Electronics Cooling Design
- Fume Hood and Biosafety Cabinet Design and Testing
- Process Control
- HVAC
- Medical Applications
- Food Processing
- Automotive

1.3 General Responsibities

1.3.1 Customer"s Responsibilities

When your Instrument arrives:

- Check the exterior of the shipping container(s) for any exterior damage, then the interior of the container(s).
- If any damage is found, immediately notify both the carrier and Degree Controls, Inc. on the straight bill of lading (supplied by the carrier), both verbally and in writing; you may also request an inspection by the carrier. Such requests must usually be made within a specified period from date of shipment.
- If no damage is found, compare the contents of the Inventory List against the contents of the shipping container(s), to ensure receipt of all components.

CAUTION: The ATM2400 and sensors are ESD sensitive devices. The units are shipped packed in ESD safe bags. When returning the devices to the carrying case, the units should be placed back in their ESD safe bags to prevent any potential ESD damage to the devices.

1.3.2 Degree Controls, Inc."s Responsibilities

- A Degree Controls, Inc. service engineer is available via telephone, fax, or e-mail to assist customers in the initial installation of your ATM2400 Instrument. Information about how to contact Degree Controls, Inc. is available on page 1. Assistance is also available from sales representatives and distributors throughout the world. Please check our web site for the Degree Controls, Inc. representative or distributor in your area.

1.4 Environmental Requirements

Excessive moisture in the air might affect the instrument"s performance by changing the electrical conductivity on the surface of the electrical components and circuit boards. Relative humidity in the operating environment between 5% and 95% (non-condensing) is acceptable.

Avoid placing the Instrument and Sensors near heating outlets or other hot devices. Acceptable temperatures are:

- Calibration temperature range: 0-70°C for standard UAS airflow and air temperature sensors. This is the range where the sensor accurately reads airflow and temperature according to its specification.
- Operational temperature range for sensor head: -20-70°C. The sensor head and sensor cable will not be damaged if exposed to these temperatures.
- Operational temperature range for ATM2400: 10-60°C. To prevent permanent damage to the ATM2400, UAS or UTS sensors, connectors, USB cable, and power supply do not expose them to temperatures outside of this range. Do not store in extreme hot or cold environments.

1.5 Using Multiple Instruments

- Some applications require more than 36 airflow and air temperature channels; others require surface temperature readings in addition to airflow and air temperature readings. For such cases, multiple ATM2400 instruments can be used simultaneously on one Personal Computer. Degree Controls, Inc."s AccuTrac 2008 software allows use of multiple instruments or channels.
- Each ATM2400 instrument requires its own USB port.

2. ATM2400 Airflow and Air Temperature Monitor

Multipoint measurement of air velocity as well as air and surface temperature are crucial steps in the new product development process. These measurements, however, have traditionally been inexact, labor-intensive, repetitive, and tedious. The new AccuSense ATM2400 has been designed to reduce cost, increase efficiency, improve accuracy and compress testing and evaluation time. Furthermore, the ATM2400 expands on the capabilities of its predecessor, the ATM24, with the inclusion of thermocouple sensors, improved airflow sensor accuracy, enhanced AccuTrac 2008 software, as well as an additional 12 channels.

2.1 General Information

The ATM2400 now allows you to perform simultaneous measurement of air velocity and of airflow and surface temperatures at 36 locations. Two ATM"s can be connected together to measure up to 72 points. The information is recorded in real-time, and can be analyzed as data is being collected. The ATM2400 uses the UAS Series of Airflow Sensors and UTS Series of Thermocouple Sensors. Improved air velocity accuracy to ±5% of reading from 15°C to 35°C, with ±8% accuracy at the operating limits of 0°C and 70°C further enhances the ATM2400"s performance.

2.2 Components

The ATM2400 kit contains the following:

- ATM2400 USB Hub
- AC power cord (US/Canada only)
- USB Cable P/N: WI131
- Carrying case
- UAS and/or UTS probes (as ordered) with Certificates of Calibration
- Accutrac 2008 Installation CD with ATM-2400 Manual included
- 50 mounting clips P/N: HDW-000072
- USB 1:1 Active Repeater Cable P/N: WI128

2.3 Electrical Power

Power is supplied to the ATM2400 through an internal universal power supply, which accepts electrical power from standard wall outlets that meet the following requirements:

- 100-250 VAC
- Frequency: 50-60 Hz

WARNING: DO NOT ATTEMPT TO POWER THE INSTRUMENT WITH ANYTHING OTHER THAN THE ORIGINAL POWER SUPPLY.

NOTE: If you are using the ATM2400 in countries other than the United States and Canada, you will need a country specific power cord. please contact your Degree Controls representative for more information.

2.4 Technical Specifications

Parameter	Technical Data
Input voltage	100-250VAC, 50-60 Hz
Power consumption	50 Watt max
Operating temperature range: Sensors	0° to 70°C
Operating temperature range: Instrument	0° to 40°C
Calibration temperature range:	0° to 70°C
Storage temperature range:	-40° to 85°C
Dimensions (LxWxH)	235 mm X 300 mm X 35mm
Weight	2.5 Kg (4.97 lb)

Table 2.4 ATM-2400 Technical Specifications

The ATM2400 complies with all the appropriate European Union Directives defined in the Official Journal. The details of the testing and conformity can be viewed in the Declaration of Conformity in Addendum A. The ATM2400 is intended for non-continuous use in a controlled electromagnetic environment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

WARNING: THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND, IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE HARMFUL INTERFERENCE TO RADIO COMMUNICATIONS. OPERATION OF THIS EUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE HARMFUL INTERFERENCE IN WHICH CASE THE USER WILL BE REQUIRED TO CORRECT THE INTERFERENCE AT HIS OWN EXPENSE.

3. Hardware Installation and Initial Power Up

On the top of the ATM2400 unit (36 channels to connect up to 36 Sensors. On the back is the USB connector for linking the system to the USB Port of the Computer.

Figure 3.1 Connector Locations to the ATM2400

Turning the instrument over, you will find the system information label on the bottom. It contains the instruments‟ part number and serial number.

After verifying that the ATM2400 instrument and sensors are complete as described earlier in this chapter, you are ready to assemble the system. (See system connection Diagram below)

Connect the external power cable to the ATM2400.

Connect the power cable to a wall outlet. For safety reasons a three-pin (grounded) outlet is required. The power supply automatically adjusts for voltages between 100-250VAC, 50-60Hz.

Attach the desired number of sensors to the ATM2400. The sensors have USB connectors and plug in only one way. Sensors can be plugged into any channel; empty slots may be left between sensors and will be ignored.

Plug the USB cable into the USB connector on the back of the ATM2400, and the opposite end into the USB port on your PC.

NOTE: CHECKING CALIBRATION: UAS and UTS Sensor calibration information is contained in the sensor memory. The information is available for review in Accutrac 2008.

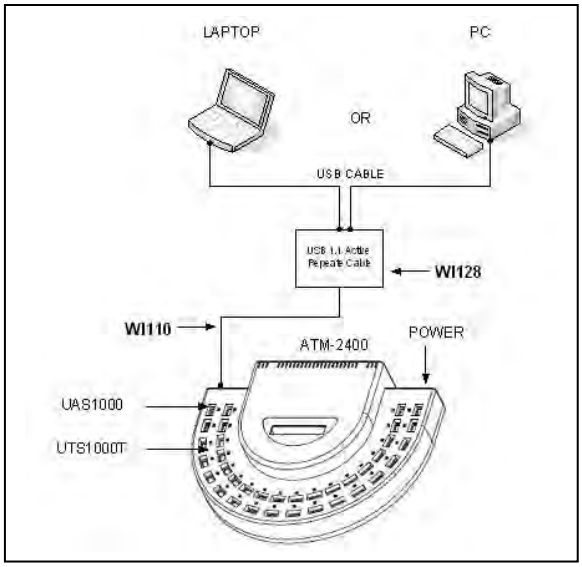


Figure 3.3 System connection Diagram

4. UAS Series Airflow Sensors

4.1 Datasheet

degreeC

ACCUSENSE

Airflow and Airflow Temperature Sensors for the ATM2400 Measurement System

features

- UAS1000 measures air velocity and airflow temperature simultaneously
- Sensors connect to the ATM2400 data hub
- Easy to use – just plug in and start measuring
- Validate thermal and airflow models quickly and accurately
- Small sensors to reach distant and compact locations
- Fully interchangeable with one another
- 3 sensor head options

overview

The AccuSense™ UAS1000 Series is an air velocity and air temperature sensor used with the ATM2400 Measurement System.

With a variety of sensor ranges from 0.15 m/s to 20 m/s (30-4000 fpm), the AccuSense UAS1000 Series offers such features as unimpaired access to tight locations, improved measurement accuracy, ease of installation, multipoint measurement, rugged construction, and probe interchangeability.

The UAS1000 offers three unique sensor head styles, remotely located on a 5 meter shielded cable, to provide access in distant and compact locations such as between semiconductor devices, heat sinks, and inside ducts and plenums. These small heads cause minimal distortion of the true airflow profile, and air velocity and airflow temperature measurements are obtained at the same time.

The AccuSense UAS1000 Series sensors are also fully interchangeable with one another, since each sensor has its own on-line circuitry normalizing the performance of each sensor.

Simultaneous use of up to 36 UAS sensors with the ATM2400 data hub allows the user to have a snapshot of the airflow environment at any given time. Multiple ATM2400's can be connected together to obtain up to 100 data points. For surface temperature measurement, please refer to the UTS1000 Thermocouple Sensor datasheet. Humidity sensing is available with the UHS1000. UAS1000, UTS1000, and the UHS1000, can be used simultaneously with the ATM2400 data hub to obtain airflow, air & surface temperature, and humidity in one instrument.

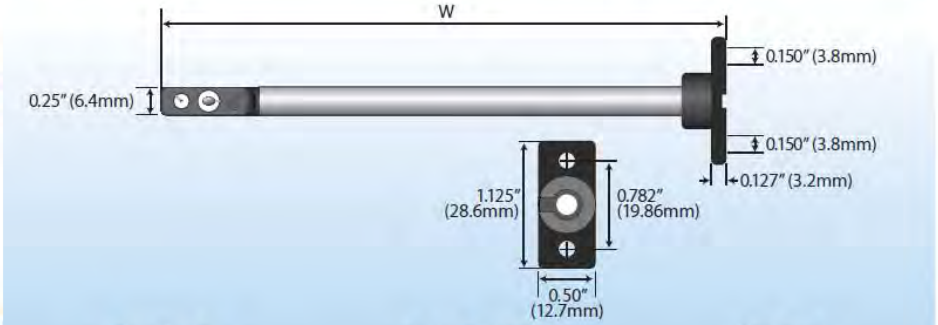
ATM2400 Data Acquisition Hub for USB Sensors

UAS-1000 Air Flow and Air Flow Temperature Sensors

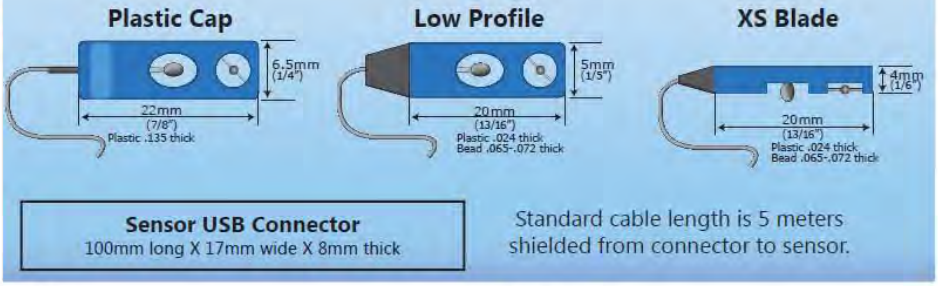
specifications

Operating temperature	0°C to 70°C
Storage temperature	-40°C to 85°C
Relative humidity (non-condensing)	5-95%
Warm up time after power up	Less than 5 seconds
Supply voltage	Supplied by the ATM data hub

sensor wand specifications



sensor head options



Sensor USB Connector
100mm long X 17mm wide X 8mm thick

Standard cable length is 5 meters shielded from connector to sensor.

airflow & temperature measurement

Air Velocity

Temperature compensation range: 0-70°C (32-158°F):
Accuracy:±5% of reading or ±0.05m/s (10fpm) or 1% of FS
Repeatability: ±1% of reading

Airflow Temperature

Measurement range: 0-70°C (32-158°F)
Measurement Accuracy[1]: ±1°C (1.8°F)
Resolution: ±0.1°C

Temperature Compensation Range: The UAS-1000 is a thermal airflow sensor; it is sensitive to changes in air density and indicates velocity with reference to a set of standard conditions 25°C (77°F), 760mmHg (101.325kPa), and 0%RH. The UAS-1000 has been designed so that when used over the stated temperature compensation range, the sensor indicates very close to actual air velocity and minimal compensation is only required to account for changes in barometric pressure or altitude. Changes in relative humidity have a minimal impact and can usually be ignored.

Accuracy: Valid between 15-35°C (60-95°F), increasing by ±0.25% per degree and ±0.005m/s (1fpm) over remaining temperature compensation range.

[1]Above 0.5m/s (100fpm), ±1.5°C (2.7°F) below 0.5m/s (100fpm).

part number format

UASXXXXXX

1100	0.15 – 1.00 m/s (30 – 200 fpm)	PC	Plastic Cap	W1	1.25" Wand Head
1200	0.50 – 5.0 m/s (100 – 1000 fpm)	LP	Low Profile	W3	3" Wand Head
1300	4.50 – 20.0 m/s (900 - 4000 fpm)	XS	Extra Small Blade	W5	5" Wand Head
				W7	7" Wand Head

Special Wide Range Application UAS Sensor - new product offering

1500 0.15 – 20.0 m/s (30 - 4000 fpm) - This style sensor approved for EnergyStar™ testing for ceiling fan systems

Specifications subject to change without notice.

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CAUTION: Thermistor beads are very hot. Touching them could cause burns and damage to the sensor.

4.2 Theory of Operation

Degree Controls, Inc. uses thermal anemometer technology for its airflow sensors. As illustrated in Fig. 3-6, a typical UAS sensor has two thermistors (thermal resistor) mounted to each sensor. The smaller thermistor (or “bead”) measures airflow while simultaneously the larger thermistor detects air temperature.

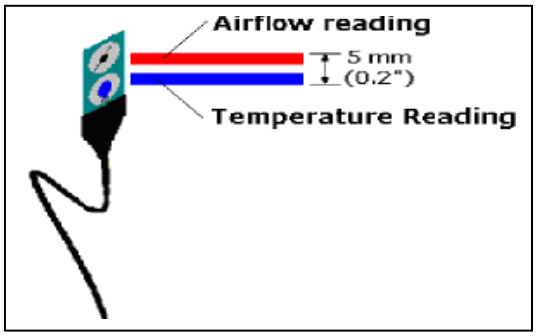

Fig. 4.3 Degree Controls, Inc. sensors measure airflow and air temperature simultaneously.

Using CTA (Constant Temperature Anemometer) technology, the airflow thermistor is heated; the amount of power required to maintain the airflow thermistor at a constant temperature is equivalent to the heat lost due to the airflow passing by the thermistor. The UAS sensor uses this information to calculate the velocity of the air passing by the sensor.

The ATM2400 can measure signals from up to 36 UAS sensors simultaneously. The data formatted by the ATM2400 is then available for transfer to a personal computer.

CAUTION: Do not attempt to measure surface temperatures using the UAS Sensors. When attached to a surface, the heated airflow sensor could cause false readings.

4.3 Mounting the Sensors on Flat Surfaces

For mounting Low Profile and XS-blade sensors in the air stream, Degree Controls, Inc. provides small self-adhesive mounting clips. To attach the sensor to the plastic clip: Hold the sensor by the black heat shrink in one hand, the clip in the other. Insert the cable 2-3" down from the sensor head through the two brackets of the clip. Turn the sensor in its intended position and slide the clip towards the sensor head until it is approximately in the center of the heat shrink. Now peel the backing off the clip, and position the clip at the predetermined location. To remove the sensor from the clip, slide it out from the clip 2-3" down the cable, and then carefully pull the cable out from the prongs of the clip. If this is done carefully, the clip can be reused at its location.

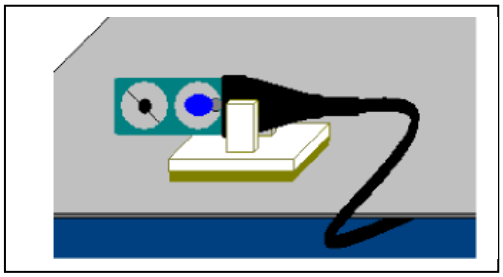

Figure 4.4 Mounting a UAS Sensors on a flat surface

CAUTION: Hold the sensor head only by the heat shrink and avoid touching the sensor beads.

Similar mounting clips are available from different vendors. For reordering Degree Controls, Inc. mounting clips, please contact the Customer Service Department for part number HDW-000072.

4.4 Sensor Head Acceptance Angle

Typically, anemometer sensors are not uniformly shaped, which causes them to be direction-sensitive. It is therefore important to know the orientation at which a sensor was calibrated, and what errors to expect if certain acceptance angles are exceeded.

For calibration, sensors are installed in the Degree Controls, Inc. wind tunnel perpendicular to the oncoming air stream. The air moves through the two holes in the sensor head (Fig. 4.5.2), across the sensor beads. Due to the aerodynamics of the sensor head, misalignment can cause the airflow to go around the sensor head rather than across the beads, which can lead to errors.

To learn about the limits of the technology, and to find the influence that the acceptance angle had on airflow sensor readings, Degree Controls, Inc. performed the following experiment. Both a Plastic Case and Low-Profile Sensor were inserted into the airflow of Degree Controls, Inc."s wind tunnel at room temperature. Readings were then recorded with the sensors turned in increments of 5° from the original perpendicular position. This experiment was performed multiple times and at different speeds to ensure repeatability.

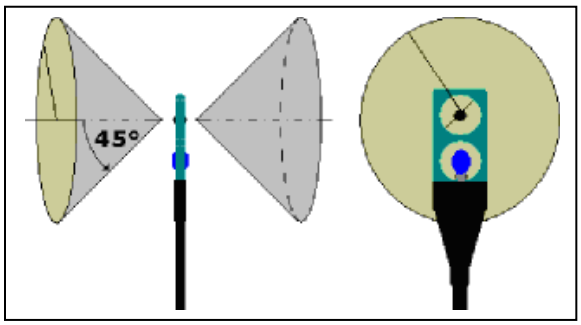

Figure 4.5.2 Airflow acceptance angle as recommended by Degree Controls, Inc.

Fig. 4.5.2 shows the airflow acceptance angle as recommended by Degree Controls, Inc. If the working angle lies within an imaginary cone with a 90° angle at the tip for Low Profile sensors, and 60° angle for Plastic Case sensors, the error from the acceptance angle will not exceed 2% compared to a reading taken perpendicular to the airflow.

Table 4.5.3 shows the acceptance angle for three different sensor heads available.

Sensor head options	Acceptance Angle
Low-profile Sensor	±45°
Plastic Case Sensor Head	±30°
Extra Small Blade Style Sensor	±60°

Table 4.5.3 UAS Sensors Acceptance Angle

4.5 General Information on Measuring Airflow

Because air is invisible, measuring the speed of airflow has always presented a challenge. The ATM2400 is a useful tool for tracking down air currents.

Most ATM2400 instruments are used in electronics cooling design, because air is the most commonly used medium to remove heat from electronics enclosures. Knowledge of the air velocity plays an important role, as it provides information on the heat removal rate and the thermal characteristics of the entire electronics system.

When air is used to remove heat from electronics enclosures, it is important to know the flow rate. The goal is to achieve the greatest cooling effect with as little air as possible. Pumping enough air through the system to ensure an acceptable temperature while at the same time keeping flow rates down to avoid acoustic noise requires careful planning. Space is at a premium, causing fan placement and fan size to be critical decisions in the design process. Knowing flow rates is essential for gathering required parameters for CFD (Computational Fluid Dynamics) software, and for validating the results from the CFD software.

Measuring airflow means tracking an invisible and compressible moving medium, which shows different characteristics depending on conditions. According to theory, in a laminar flow all particles move in parallel tracks (layers) and in the same direction. In turbulent flows the exchange is macroscopic and detectable, because the main current is superimposed by additional components in x, y, and z directions (eddy-currents). The change from laminar to turbulent flow happens when the Reynolds Number reaches critical levels, which depends on a number of parameters such as shape and cross section of flow.

Airflow in electronics cooling is usually very turbulent due to fans, obstacles, and heat sources. Therefore, measuring velocities requires sensors that are capable of sensing accurately under such conditions, while minimizing further disturbance of the flow.

For many reasons, thermal anemometers are the best tools available for measuring airflow in electronics cooling. Degree Controls sensors‟ small size minimizes obstructions in a crowded enclosure. They have a fast response time and high sensitivity, allowing measurement of turbulence intensity. Thermal sensors are available with most standard interfaces, are very reliable, and relatively low-cost.
Thermal anemometry is a method of determining fluid velocities by measuring the heat transfer rate from a heated small object like a wire, film, or thermistor located in the flow. The rate at which heat is removed from the sensor is directly related to the velocity of the fluid flowing past the sensor. Constant Temperature Thermal anemometers (CTA) work like a finger held up in the wind. Kept at a constant temperature above ambient, the device is cooled by passing air. The power required to maintain a constant temperature is then used to calculate the air speed.

Thermal anemometry is a flexible, accurate, and almost entirely automated method of flow measurement. It can be applied to nearly any flow, where the physical presence of a sensor does not adversely affect the current, or where contaminants in the flow do not damage the sensor. It is particularly appropriate for applications requiring rapid response to flow changes (turbulence measurements), and where cost limitations are a factor.

Heated anemometers are best characterized by the heat transfer rate, which describes the heat loss dependent on multiple factors: temperature, pressure, content of gas, and nature of flow. Not all of the above have the same influence on measurement, but each one should be considered to achieve accurate readings.

Temperature: Thermal anemometers require temperature compensation because the heat transfer rate depends on the temperature differential between the heated sensor and ambient air. The greater the temperature differential, the greater the heat loss and, consequently, the greater the signal. However, a hot device can also alter the nature of the flow by adding heat, or causing warm air to rise.

Pressure: Molecules carry heat. Below standard pressure (760mm Hg, 101.3kPa), e.g. at high altitude or in a vacuum chamber, a lower number of molecules is available to carry away heat from the heated sensor, which will then read low. Above standard pressure, additional cooling is provided due to an increased number of molecules, and the heated sensor would read high. Heated anemometers therefore need to be pressure compensated.

Content of gas: Thermal anemometers usually are calibrated for air in human environments. When such a sensor is used with gases different from room air, the calibration might no longer be accurate due to different heat capacity and heat transfer rate of the medium. Aggressive chemicals could damage the probe, and deposits on the probe head may alter aerodynamics and affect the accuracy of readings. Humidity does not necessarily change heat transfer rates significantly. Studies show that there is less than a 3% change in the velocity reading while relative humidity changes from 5 to 95% in air at room temperature. However, water condensing on the sensor can cause calibration errors.

Nature of Flow: Air forced through tight openings or nozzles shows different characteristics than a current moving along a straight duct. Fans can generate heavily turbulent flows in a corkscrew-like pattern even far downstream. Components on a circuit board or obstacles in ducts are likely to redirect flow, which tends to follow the path of least resistance. Rapid pressure changes are likely where gases are forced through nozzles, tight openings or close to fast-turning fans. Air is a compressible medium, and due to its invisibility may exhibit unforeseeable behavior that could affect readings of thermal anemometers. It is therefore always advisable to verify results.

4.6 Temperature Compensation

The calibration of all thermal anemometers is profoundly affected by the ambient temperature of the air flowing past them. Unless an anemometer is compensated for this, it will be correct only at the temperature at which it was calibrated. Therefore, temperature compensation is essential, and typically incorporated with such products. To do this, the ambient temperature of the flowing air is measured and used as part of the compensation algorithm, to provide a compensated air velocity measurement.

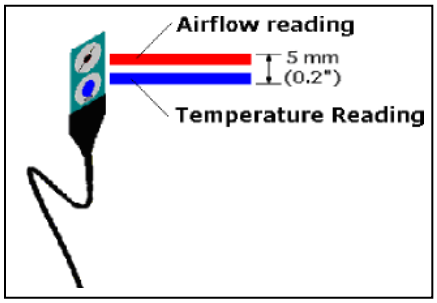

Fig. 4.7 Degree Controls, Inc.'s 2-sensor approach

There are different ways to do this. Degree Controls, Inc. uses two separate sensors for airflow and temperature (Fig. 4.7). The temperature sensing thermistor and the airflow sensing thermistor are mounted in close proximity to one another. Airflow and temperature signals are sampled virtually simultaneously, and read into the system. The small displacement in position (5 mm / 0.2") between the two is immaterial for most purposes, since flow inside cooling systems typically is very turbulent and is not markedly isothermal in most cases.

4.7 Detecting Low Air Speeds

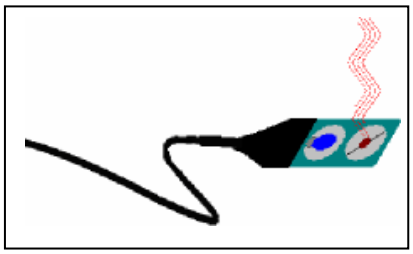

Fig. 4.8 Heated sensors may cause convection at very low flows

There is one limitation to thermal anemometers. At low velocities, below 0.15 m/s (30 fpm), hot air rises upwards from the heated sensor (convection). This thermal convection can be detected by the hot bead, and produce erroneous airflow readings. This problem is typical of all heated anemometer sensors, and users should question accuracy claims of 0 m/s (0 fpm).

The ATM2400/UAS temperature reading is always calibrated for 0-70°C. It is independent of airflow above 60 fpm. Below 60 fpm the sensor experiences self-heating which leads to an elevated temperature reading.

4.8 Sensor Mounting

When mounting thermal anemometer sensors in electronics enclosures, on circuit boards, heat sinks and close to fans, it is advisable to keep the following issues in mind to avoid inaccurate readings:

Air always takes the path of least resistance. That's usually the widest opening.
Sensors might block or redirect flow if placed close to tight openings or obstacles.
Close to fans the airflow is usually extremely turbulent and eddies might cause a reversed airflow.
Always use sensors within their specified calibration range only, and have sensors recalibrated asrecommended by the manufacturer.

If you have further questions or comments, please contact Degree Controls, Inc. Technical Support

5. UAS2000 Series Remote Air Flow Micro Profile Sensors

UAS2000 is world"s smallest remote airflow sensor. Please see the datasheet below.

5.1 Data Sheet

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ACCUSENSE

UAS 2000 Product Overview

Image 1: The UAS2000, micro bead sensor. UAS1000

Thank you for purchasing a Cambridge Accusense™ product, from Degree Controls, your partner in air flow and thermal engineering.

Degree Controls, Inc. is an ISO-9001 certified world-class Designer and Turn-Key Manufacturer of control solutions for progressive technology industries. With over 15 years of proven experience, we pride ourselves in delivering solutions to our customers that provide the differentiation they need for their rapidly changing competitive landscape.

The UAS2000 air velocity sensor is a purpose-built sensor used for accessing air velocity and air temperature data within the tight regions of space that are typically found in dense electronic products. The USB interface allows very quick data collection on a PC; this is made even faster using Accutrac™, the data logging software that enhances the UAS2000 instrument. Before using the UAS2000, be sure to install this software, available from our website. The UAS2000 should serve you well over years of use, improving your testing and airflow studies, as well as your product designs.

accuracy vs. repeatability:

As an air velocity sensor user, it is very important to understand the concepts of accuracy and repeatability, and how they pertain to the UAS2000. Accuracy is a measure of the sensor's air velocity measured value, as compared to the actual air velocity. The accuracy is stated as a percentage deviation from the actual air velocity. Repeatability is a measure of the air velocity sensor's reading delta (change) when taking two readings in the same controlled experiment. By comparing the two results, one can express how well the sensor measures the changes in air velocity in one experimental setup. Sensors with excellent repeatability of reading, like the UAS2000, are very useful for determining the effect that external parameters such as fan speed and filter blockage have on the air velocity within the system.

how to use the UAS2000:

You have likely bought a UAS2000 to conduct air velocity sensing in very tight spaces, and you are probably trying to determine how external parameters such as fan speed, filter clog, and packaging design changes will affect your air velocity, as well as the associated temperature effects. In these experiments, the repeatability of reading is most important in trying to understand how changing those external parameters will impact your air velocity; absolute accuracy of reading is of less importance in these experiments. Should accuracy of reading be required, the UAS1000 sensors are the preferred option; however they are larger sensors which cannot be placed in such tiny regions of space, like the UAS2000. This is a purposeful trade-off in the sensor technologies, and often, a customer will use both the UAS1000 and the UAS2000 sensors in well-designed air flow experimentation.

set up:

Your goal when using the UAS2000 is to position the sensor element in areas of best laminar flow, which can be verified by running an experiment and watching the air velocity reading over time. Once a good sensing location has been found, your experimentation may begin.

set up considerations:

1. The small UAS2000 sensor bead head is fabricated using special tubing with a red and blue stripe to indicate the direction of calibration. The red stripe indicates the direction that should face the air flow for the most accurate actual flow velocity. See Image 2: UAS2000 orientation.

2. It may be best to try several locations (often in relatively close proximity) to find the one that has the least variation under steady state conditions over some period of time. Use Accutrac™ to monitor and log your data while conducting these placement feasibility tests.

3. Consider heat-producing devices within your products. If you are conducting air velocity sensing experiments while your electronic board or device is powered, be sure to consider if a particular component may be imparting a plume of heat close to the sensor element, as this will cause temperature readings in that area to be higher than you expect.

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consider the ...

ATM2400 Measurement System with up to 36 channels of USB connected data ports for air velocity, air temperature, and surface temperature readings using Accutrac™ Plus Software.

completing your testing:

Once you have finalized your experiment, replace the sensor element cover and store the sensors in a controlled environment, such as a laboratory supply cabinet. Sensors left on work benches will, over time, be covered in dust or residue that will impact the accuracy of your sensor.

At the completion of an experiment, consider the next calibration due date, and plan ahead. It's common for users to start a new experiment forgetting that they should have had their sensors recalibrated causing delays in their work.

Enjoy the testing possibilities that your UAS2000 sensors provide you. Should you need help, advice, repairs, or an embedded air velocity sensor for your production product, call Degree Controls, your source for air flow sensing and controller products.

recalibration:

The UAS2000 is a precision instrument that should be recalibrated annually to ensure you derive the most precise readings possible. Your sensor has a coded calibration date in its internal memory, which will announce on Accutrac™ when sensor re-calibration is due. Be sure to manage this activity with care, so that you can return the UAS2000 sensors for recalibration during times when you are not in need of experimental results. Re-calibration will typically require 3-4 weeks of time, however with advanced notice this schedule may be reduced by 50%. Regular calibration is the only way to ensure your testing quality and procedural standards are being met. Regular, traceable calibration is also necessary for meeting most ISO 9000 quality standards.

care:

The UAS2000 is a very delicate instrument and should be treated with care. In order to provide a fast response time, and highly repeatable readings, we have employed a sensitive element to maximize the performance of the sensor. If the sensor element is broken, Accutrac™ will notify you. The sensor elements will stand up to years of use when treated properly, but should never be touched directly, as oils and impurities deposited on the sensor element can cause permanent damage.

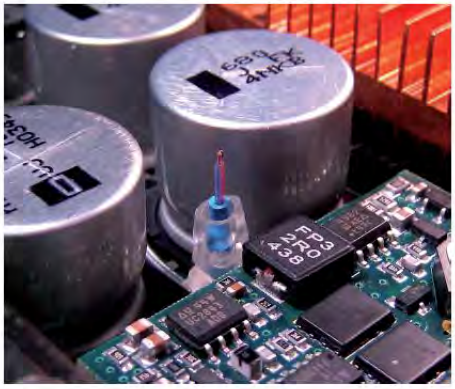

Image 2: UAS2000 orientation.

flow visualization:

When running experiments involving airflow, consider using a flow visualization tool such as the Flowmarker. The fine aerosol fog produced by this tool can assist in finding less turbulent flow regions more suitable to sensors, and can also help in understanding downstream macro level flow scenarios created within your products.

It is essential to use a fog generation product like the Flowmarker, as it will not deposit smoke or residue onto the air velocity sensors, or the unit under test. The Flowmar , oduces a completely non-toxic fog that is ideal for air velocity studies.

The Flowmarker complements your purchase of the UAS2000 air velocity sensor, providing a comprehensive air flow study while speeding up your setup time for new experiments.

Image3: Flowmarker visualization tool.

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6. UTS1000 Series Temperature Sensors

6.1 Datasheet

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UTS1000 - Thermocouple Sensors for the ATM2400 Measurement System

features

- UTS Series measures surface temperatures
- USB sensor offers up to ±1.5°C accuracy when used with appropriate thermocouple
- Compatible with the ATM2400
- Easy to use – just plug in and start measuring
- Electrically isolated up to 1500V.
- Suitable for T thermocouple wire
- Excellent for measuring live electronics
- Thermocouple interchangeable with sensor body

overview

The AccuSense UTS1000 are USB based thermocouple sensors for use with the ATM2400 Measurement System. The ATM2400 data hub holds up to 36 sensors. Users of the ATM2400 can obtain thermocouple measurements as well as airflow and airflow temperature measurements (see UAS1000 Series) in one instrument.

The UTS1000T is equipped with standard miniature connectors and has a measurement range of –50°C to 250°C. The intrinsic accuracy is ±1.0°C, with a cumulative accuracy of ±1.5°C when used with the supplied thermocouple. The thermocouple is constructed of 5 meter 30AWG sheathed SLE (Special Limited Error) grade cable for abrasion resistance and optimum measurement accuracy.

AccuTrac 2005 software allows you to collect, analyze and store the data quickly and easily. Data is collected for each sensor in an Excel format, with a choice of statistical calculations of each sensor reading such as min/max, standard deviation, and averaging.

specifications

Storage temperature	-20°C to 80°C
USB instrument operating temperature	10°C to 60°C
Relative humidity (non-condensing)	5-95%
UTS1000T measurement range	-50°C to 250°C
Step change settling time	4 seconds max
Response time	2 seconds typical
Stability	±0.2°C over 1 minute period
Accuracy	±1°C (Sensor without thermocouple, ±1.5°C with supplied thermocouple)
Supply voltage	Supplied via USB
USB/ATM2400 connector dimensions	100 mm long X 17 mm wide X 8 mm thick

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is an ISO-9001 certified world-class Designer and Turn-Key Manufacturer of control solutions for progressive technology industries. With over 15 years of proven experience, we pride ourselves in delivering solutions to our customers that provide the differentiation they need for their rapidly changing competitive landscape.

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NOTE: The ATM2400 only supports T-Type Thermocouples

6.2 Thermocouple Basics

Thermocouples (TC) are sensors for measuring temperature. A thermocouple consists of two wires of dissimilar metals, joined together at one end, generating a small unique voltage (mV) at a given temperature (called the Seebeck Voltage). This voltage is measured and interpreted by a thermocouple instrument, which is a voltmeter.

There are eight letter-designated standardized thermocouple types:

Noble metal types B, R and S, and

Base metal types E, J, K, N, and T.

Different TC types use different combinations of metals for the two dissimilar wires. Examples:

J-type: Iron vs. Copper-Nickel alloy (Constantan)

K-type: Nickel-Chromium alloy vs. Nickel-Aluminum alloy

T-type: Copper vs. Copper-Nickel alloy (Constantan)

TC types can be recognized by the color code used on their insulation and jacket.

Type	Material	USA	UK	Germany	Japan	France
J(+)	Fe	White	Yellow	Red	Red	Yellow
J(-)	Cu-Ni	Red	Blue	Blue	White	Black
K(+)	Ni-Cr	Yellow	Brown	Red	Red	Yellow
T(-)	Ni-Al	Red	Blue	Green	White	Purple
T(+)	Cu	Blue	White	Red	Red	Yellow
T(-)	Cu-Ni	Red	Blue	Brown	White	Blue

Table 5.3 Color coding of lead wires of thermocouple types

T-type thermocouples should not be used above 400°C or where moisture is present, because copper oxidizes quickly. K-type is more resistant against oxidation (important only above 400°C).

Each thermocouple type requires a different calibration curve to interpret the thermocouple-generated voltages. A wide range of temperature measurement is offered, from almost absolute zero to above a thousand degrees Celsius. Thermocouples can be calibrated for high accuracy in fractions of degrees if needed.

Criteria for choosing thermocouple types:

Sensing air, liquid or surface temperature Temperature range
Chemical, physical resistance Abrasion resistance
Vibration resistance
Galvanic or electric insulation Immersion
Fast response time (wire gage)

Thermocouples are widely available from local and mail order vendors. There are different wire gauges (AWG) available, shielded, electrically insulated, or coated to be chemicals resistant.

6.3 Mounting Thermocouples

Thermocouples measure the temperature at the measurement junction. They do not necessarily measure the temperature of an adjacent surface or object, unless an excellent thermal contact has been established, which brings the measurement junction to the same temperature.

Embedding the measurement junction in a hole or grove in the surface to be measured provides best heat transfers. Soldering or welding a thermocouple to the surface offers good heat transfer. Glue (plastic) may not be as good a heat conductor as metals. Heat conductive glue and paste are available from vendors of thermal management tools.

It is particularly important to attach a thermocouple as close to the surface as possible and to avoid air bubbles, as air insulates well.

6.4 Electrical Isolation

The UTS 1000 series sensors provide electrical isolation up to 1500 VRMS, which allows users to measure temperature on live electrical circuits; however care should be taken when connecting the thermocouple to live circuitry to prevent shock to personnel, or damage to equipment.

WARNING: LIVE ELECTRICAL CIRCUITS CARRY POTENTIALS THAT COULD INJURE PERSONNEL. ENSURE POWER IS REMOVED FROM CIRCUITS BEFORE ATTACHING THERMOCOUPLE LEADS.

7. UHS1000 Series Humidity Sensors

7.1 Data Sheet

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ACCUSENSE

UHS1000 Humidity Sensor with USB connector

description

The AccuSense UHS1000 Series is the newest USB based relative humidity and temperature sensor used with the ATM2400 Measurement System.

The AccuSense UHS1000 Series offers such features as unimpaired access to tight locations, improved measurement absolute accuracy of ±3% RH reading from 10 to 90% RH, ease of installation, multipoint measurement, rugged construction, and probe interchange ability.

The sensor comes with a 1 meter shielded cable, to allow access in distant and compact locations such as between semiconductor devices, heat sinks, and inside ducts and plenums.

These small heads cause minimal disturbance to the airflow pattern and both relative humidity and airflow temperature measurements are obtained at the same time.

The AccuSense UHS1000 Series sensors are the newest in our family of USB based sensors, which are fully normalized and calibrated to work with each other.

The ATM2400 data hub provides the user with a snapshot of the environment at any given time. For surface temperature measurement, please refer to the UTS1000 Thermocouple Sensors datasheet. The three sensors, UAS1000, UTS1000, and UHS1000 can be used simultaneously with the ATM2400 data hub to obtain air velocity & air temperature, surface temperature, and relative humidity in one instrument.

For use with your computer USB port or as part of the ATM2400 system.

features

- UHS1000 measures relative humidity and temperature simultaneously
- Sensors connect to the ATM2400 data hub
- Easy to use – just plug in and start measuring
- Validate RH and temperature quickly and accurately
- Small sensors to reach distant and compact locations
- ±3% of RH reading accuracy from 0-90% RH
- Fully interchangeable with one another
- RoHS6 and lead-free

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ATM2400 Data Acquisition Hub for USB Sensors

ATM2400 and UHS1000 sensors sold separately

UHS1000 series airflow & temperature measurement range

RH Range: 0 to 90% RH

Temperature range: -40 to 123°C (-40° - 254°F)

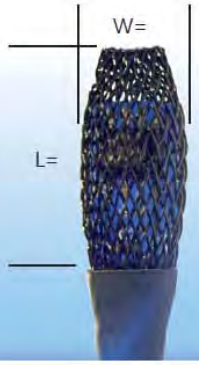
Relative Humidity Accuracy
0 - 70°C (32° - 158°F) Greater of ±3% of RH reading
Repeatability is ±0.1% under same conditions

Temperature Accuracy
0-70°C ±0.3°C (32° - 158°F)
Repeatability is ±0.1°C

specifications

Operating temperature	0°C to 70°C (32° - 158°F)
Storage temperature	-20°C to 80°C (-4 - 176°F)
Relative humidity (non-condensing)	0- 90% RH
Response Time	Less than 5 seconds – typically 4 seconds
Long term stability	Typ. < 0.5 % RH/yr
Supply voltage	Supplied by ATM2400 data hub or standard USB port

sensor head dimensions



Standard cable length is 1 meter (39") shielded from connector to sensor head

Sensor Head Dimension:

8.25mm (.325") x 19.43mm (.765") x 4.17mm (.164") (WxLxD)

Sensor USB Connector

100 mm long X 17 mm wide X 8 mm thick

ATM2400 & UHS1000 sold separately.

***WARNING:** Specifications subject to change without notice*

8. ACCUTRAC PLUS

The Windows-based AccuTrac plus software package turns your PC into a powerful test and analysis center. Used with the new AccuSense ATM2400 USB-based airflow and temperature instrument, AccuTrac collects airflow and temperature data in real-time and displays, saves, reviews, graphs, and prints without the need to export to another program. The user-friendly AccuTrac software increases measurement versatility, reduces testing time, and improves testing flexibility. Users can choose whether all data are to be viewed and graphed real-time, or saved and reviewed later.

Increased flexibility is also achieved by adjusting sampling rates of the UAS & UTS sensors to better understand turbulence. AccuTrac plus is compatible with the ATM2400 Multipoint Airflow and Temperature Instrument which uses the UAS1000 Airflow and Airflow Temperature Sensors, and UTS1000 Thermocouple Sensors.

8.1 Setup and Installation

Before you can achieve full utilization of your new ATM2400 system, Accutrac plus must be installed on your PC.

8.2 Minimum System Requirements

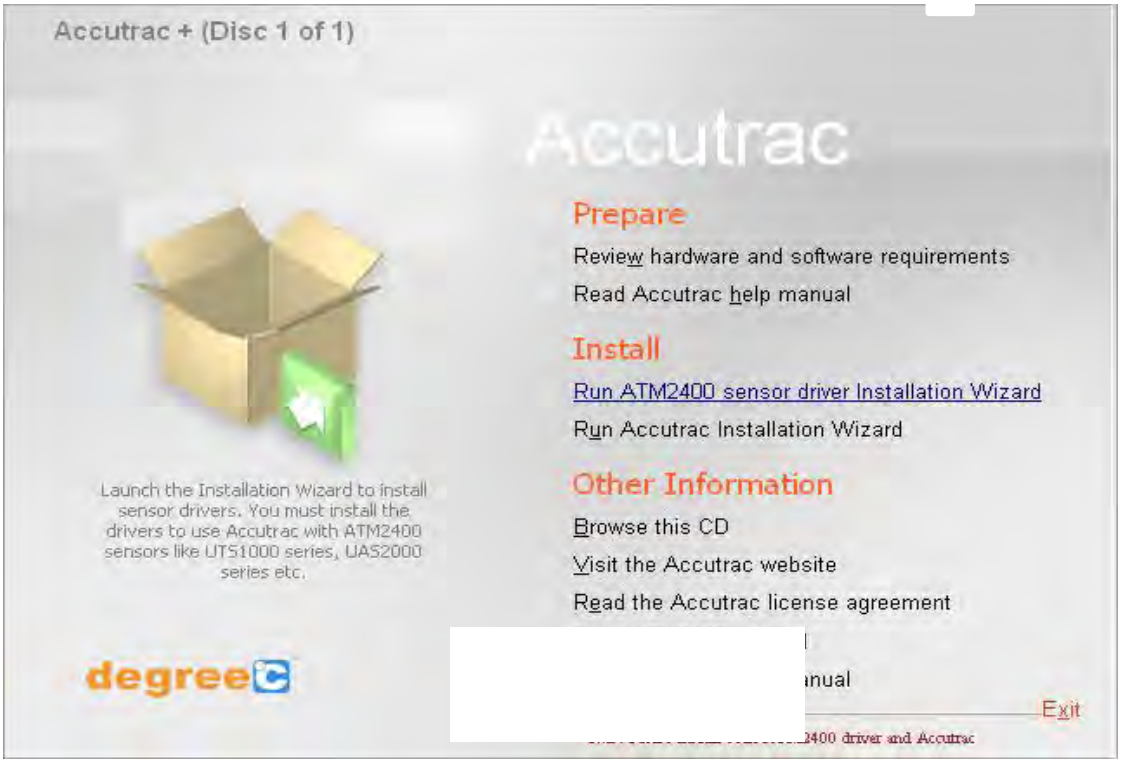
- Operating System : Windows 2000 or Windows XP and higher.
- Hard Disk Space : 50 MB of free space is required
- CPU : 1.0 GHz processor
- RAM : 512 MB

8.3 Hardware Installation

To install the required drivers for ATM2400 series sensors:

Step 1:

Select "Run ATM2400 sensor driver Installation Wizard" from the setup page.


Accutrac + (Disc 1 of 1)
Accutrac
Prepare
Review hardware and software requirements
Read Accutrac help manual
Install
Run ATM2400 sensor driver Installation Wizard
Run Accutrac Installation Wizard
Other Information
Browse this CD
Visit the Accutrac website
Read the Accutrac license agreement
Launch the Installation Wizard to install sensor drivers. You must install the drivers to use Accutrac with ATM2400 sensors like UTS1000 series, UAS2000 series etc.
degreeC
Exit

Step 2:

Select Install to continue.

Step 3:

If another version of the driver is already installed on the machine, then you may get a message like the one below. Select 'Yes' and remove the conflicting drivers.

Notice
The following conflicting drivers have been found, and must be removed before the installation can continue:
Cambridge AccuSense ATM2400 Sensor Device
Cambridge AccuSense ATM2400 Sensor
Do you want to remove these now?
Yes
No

If the driver is up-to-date, the following message will be displayed. Select 'OK' and no need to remove it from the machine.

Step 4:

If are using the unsigned version of the driver, you will get a message like the following. Select “Continue Anyway", since it is safe to use this driver and it is from a trusted source.

Software Installation
The software you are installing has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the software vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation

8.4 Downloading Accutrac™ from the Degree Controls Website

To download the latest version of Accutrac™, go to our website: www.degreeC.com and go to DOWNLOADS, find AIRFLOW INSTRUMENTS and choose the ATM-2400 version.

Verify that the system requirements are compatible with your PC, and click on DOWNLOAD to download the latest Setup.

Run the setup file and respond to the prompts that appear to complete the installation.

8.5 Software Installation

- By installing Accutrac plus, the user shows that they have read, understood, and accepted the license agreement as stated in the license.txt file. Please also review the latest information about the product in the readme.txt file.
- There are two methods of software installation: From the CD included with your product shipment or from the Degree Controls, Inc. website.

NOTE: Degree Controls, Inc. regularly updates its software. To ensure that you have the latest revision, visit the Degree Controls, Inc. web site http://www.DegreeC.com, where the latest version will always be available for free download.

NOTE: Remove previous installations of AccuTrac completely from the PC before installing a new version. To remove a previous installation, go to Control Panel, Add/Remove Programs and select the program you want to remove.

8.6 Software Installation from CD-ROM

To install the software from CD-ROM, insert the disk into the drive. If setup does not launch automatically, either click Start, and Run, to browse to the CD, or use the My Computer icon on your desktop to browse to the CD and double click on the .exe file.

The Accutrac Install Shield Wizard will guide you through the process of installing the software on your computer. The software can be installed either on your local hard disk, or on a network file share. Contact your local systems administrator for assistance.

Follow the directions until the installation is complete. You may be required to enter some information during the installation. When in doubt, it is advisable to use the default settings.

To complete the installation, you may be required to reboot your PC.

If you experience ant installation problems, please contact Degree Controls, Inc. Tech Support.

Step 1:

Double click on the file Setup.exe to start the installation.
Select "Run Accutrac® Installation Wizard" from the setup page.

Step 2:

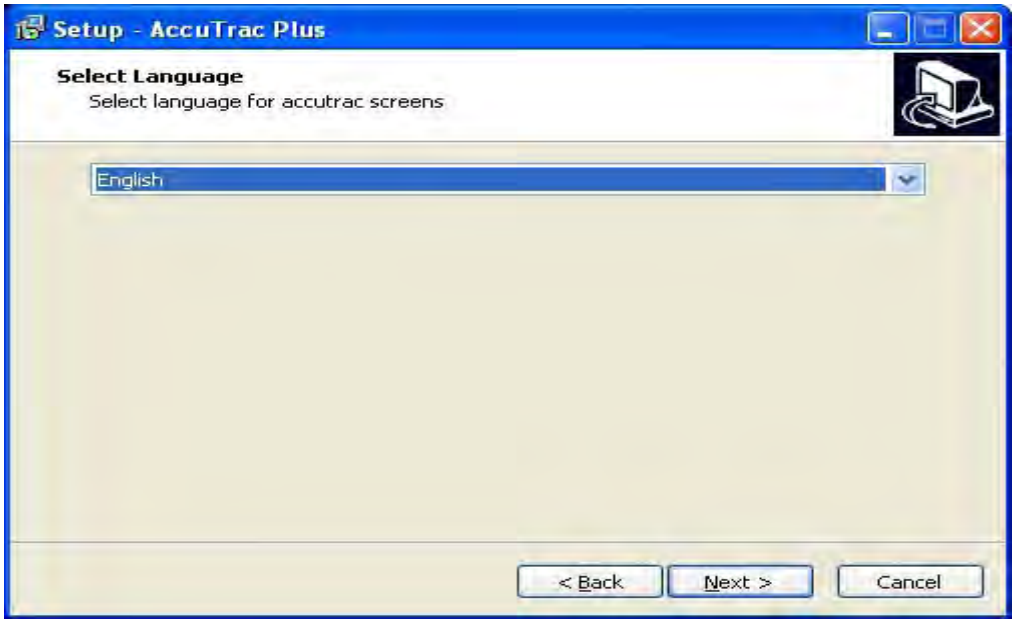
Select the language you want to work with during the installation.

Step 3:

Setup - AccuTrac Plus
Welcome to the AccuTrac Plus Setup Wizard
This will install AccuTrac Plus 12.4 (WinNT) on your computer.
It is recommended that you close all other applications before continuing.
Click Next to continue, or Cancel to exit Setup.
Next >
Cancel

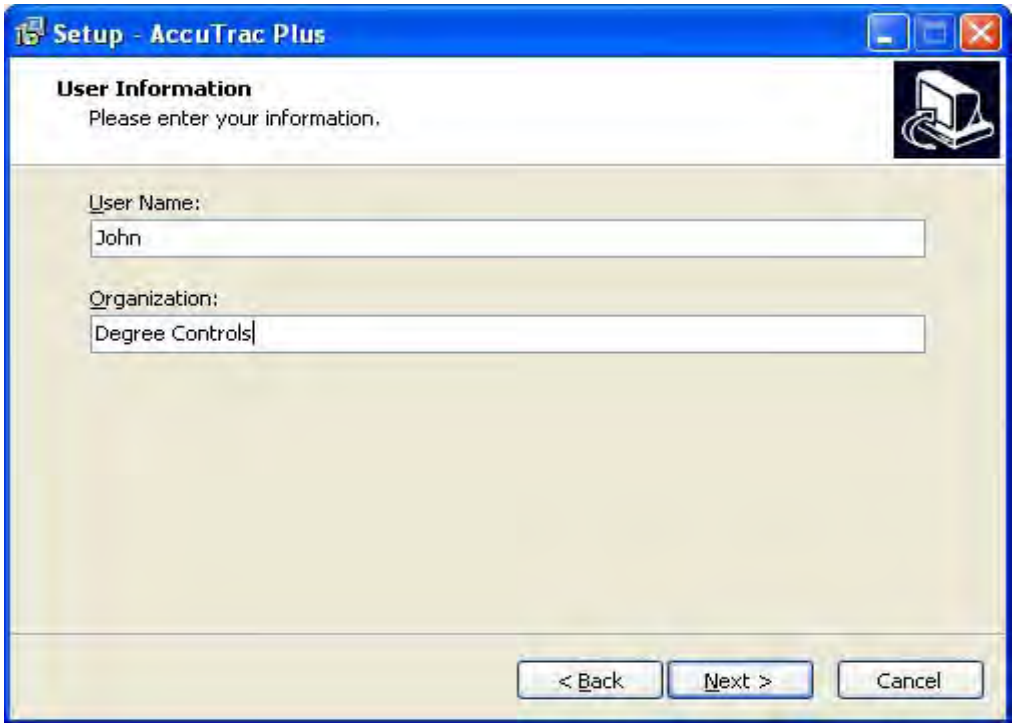
Click on 'Next>' to continue.

Step 4:



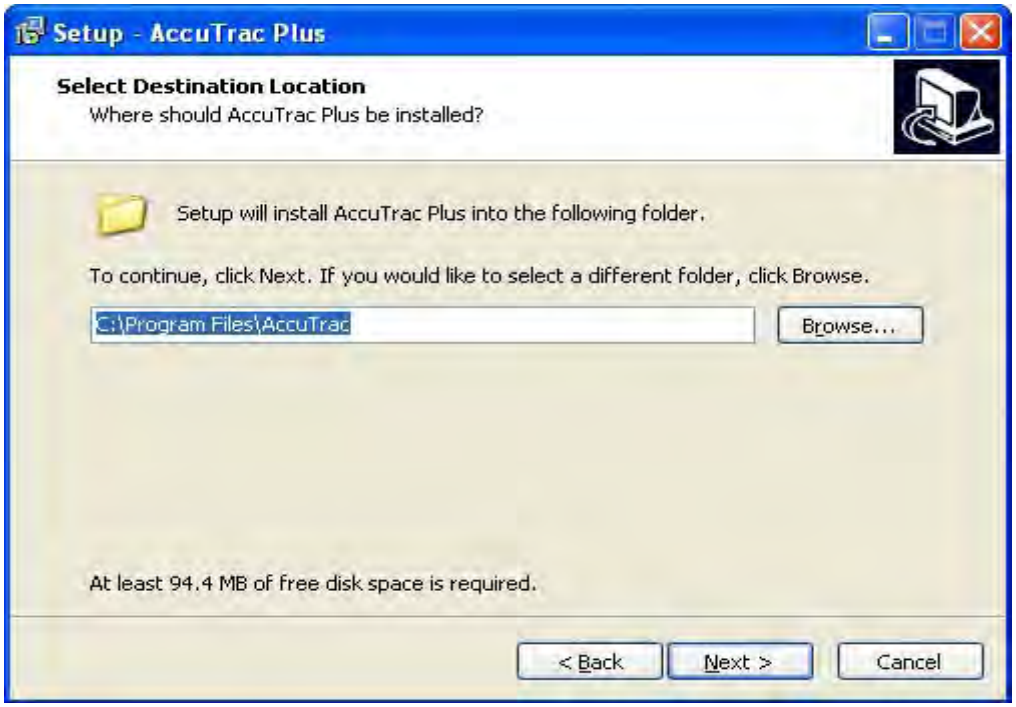
Select the language you want to work with AccuTrac (AccuTrac is currently available in English, French, German, Spanish, Japanese and Chinese). Click on 'Next>' to continue.

Step 5:



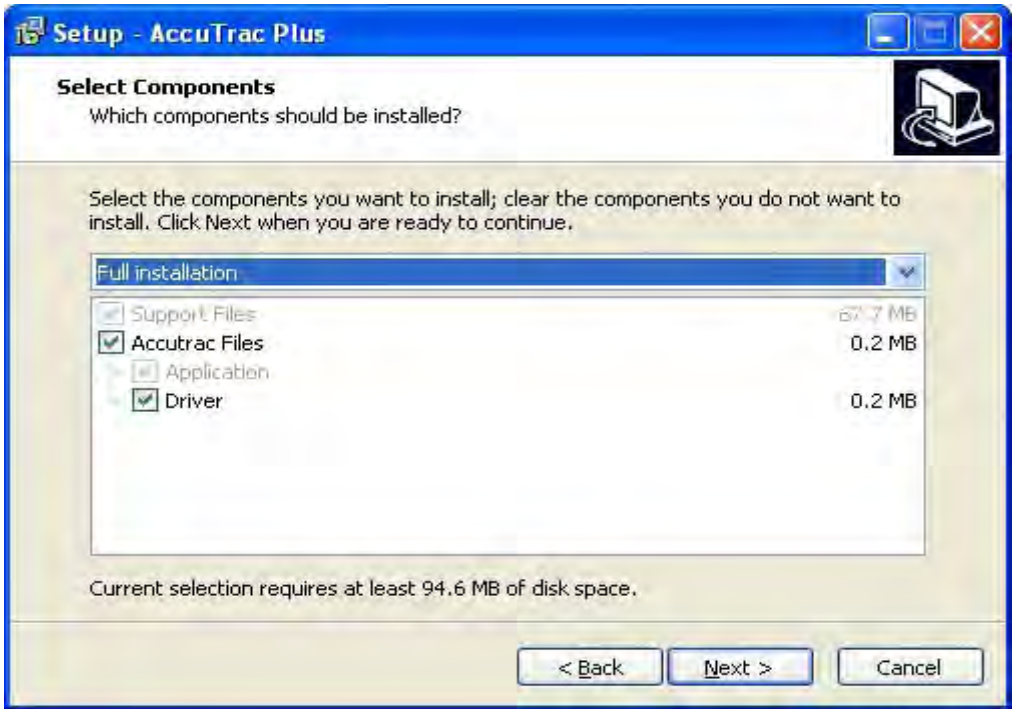
Enter a valid User Name and Organization, If any information is not enter the default will be taken. Click on 'Next>' to continue.

Step 6:


Setup - AccuTrac Plus
Select Destination Location
Where should AccuTrac Plus be installed?
Setup will install AccuTrac Plus into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\Program Files\AccuTrac
Browse...
At least 94.4 MB of free disk space is required.
< Back
Next >
Cancel

Select the installation folder, if you don't want the default. Click on 'Next>' to continue.

Step 7:


Setup - AccuTrac Plus
Select Components
Which components should be installed?
Select the components you want to install; clear the components you do not want to install. Click Next when you are ready to continue.
Full installation
Support Files
Accutrac Files
0.2 MB
Application
Driver
0.2 MB
Current selection requires at least 94.6 MB of disk space.
< Back
Next >
Cancel

Select the components you want to install; by default both the components will be selected. Click on 'Next>' to continue.

Step 8:

Setup - AccuTrac Plus
Select Start Menu Folder
Where should Setup place the program's shortcuts?
Setup will create the program's shortcuts in the following Start Menu folder.
To continue, click Next. If you would like to select a different folder, click Browse.
AccuTrac
Browse...
< Back
Next >
Cancel

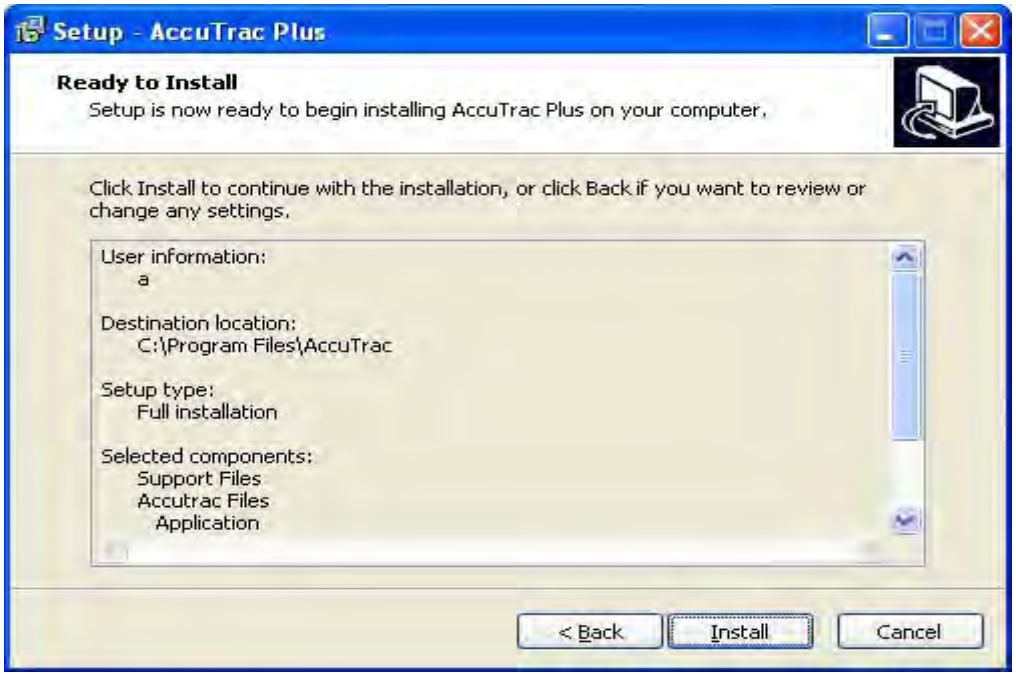
You can select another Programs folder, if you want. Click on 'Next>' to continue.

Step 9:

Setup - AccuTrac Plus
Select Additional Tasks
Which additional tasks should be performed?
Select the additional tasks you would like Setup to perform while installing AccuTrac Plus, then click Next.
Additional icons:
Create a desktop icon
< Back
Next >
Cancel

It may be useful to put a shortcut to Accutrac® on your desktop. Click on 'Next>' to continue.

Step 10:

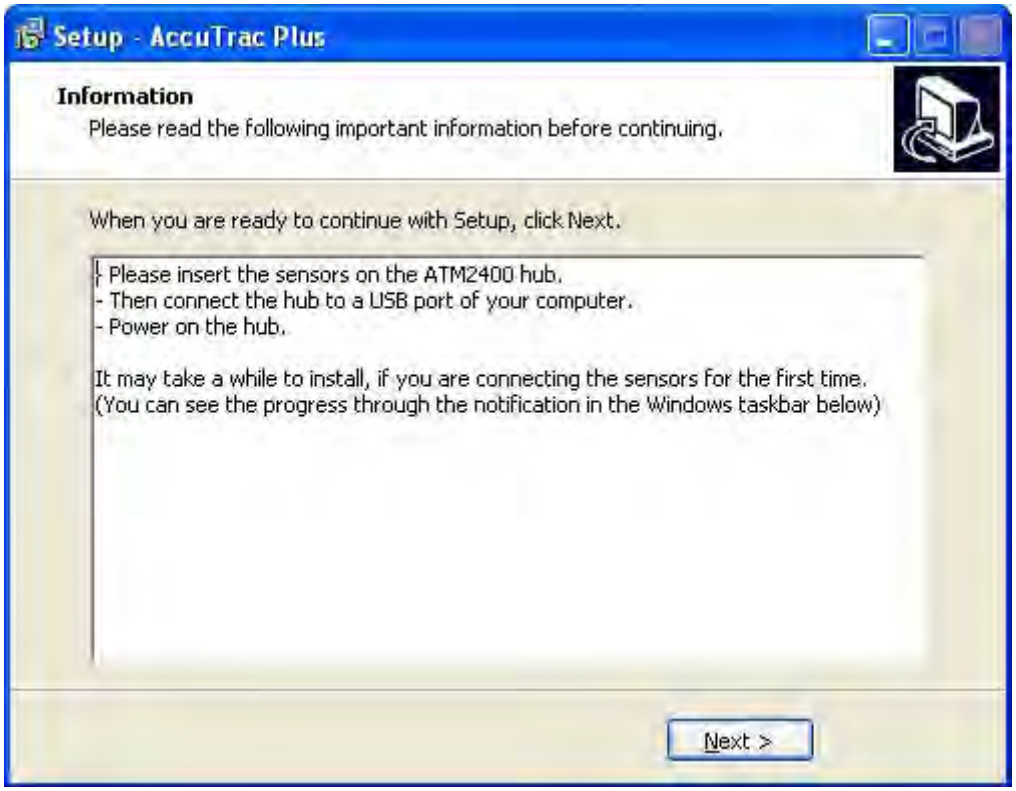


Click on 'Install' to continue the setup. Click on '<Back' if you have something to change.

Step 11:

If you have selected the driver component in **Step 7,** then driver installing process continues. Click on 'Install' to continue.

Step 12:

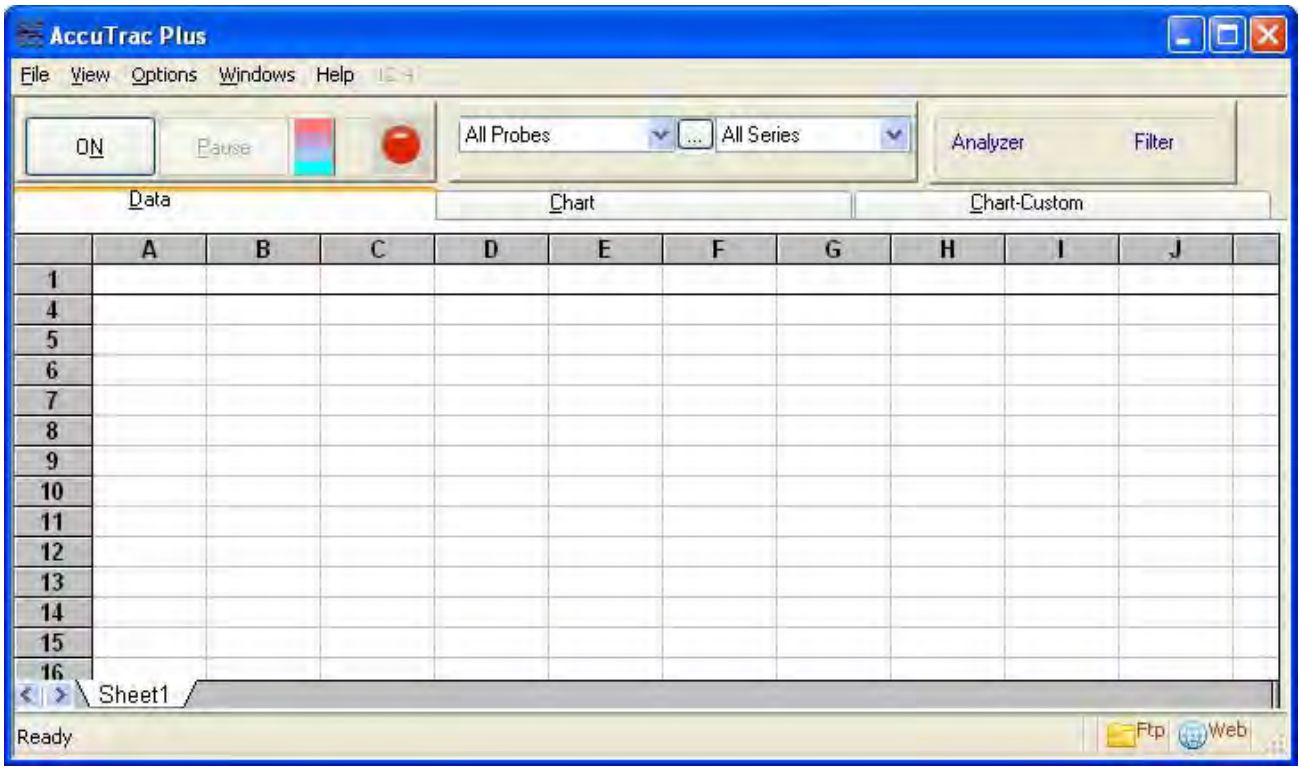

Setup - AccuTrac Plus
Information
Please read the following important information before continuing.
When you are ready to continue with Setup, click Next.
- Please insert the sensors on the ATM2400 hub.
- Then connect the hub to a USB port of your computer.
- Power on the hub.
It may take a while to install, if you are connecting the sensors for the first time.
(You can see the progress through the notification in the Windows taskbar below)
Next >

Click on 'Next>' to continue.

Step 13:

Setup - AccuTrac Plus
Completing the AccuTrac Plus Setup Wizard
Setup has finished installing AccuTrac Plus on your computer. The application may be launched by selecting the installed icons.
Click Finish to exit Setup.
Launch Accutrac
< Back
Finish

Step 14:



If you have checked 'Launch AccuTrac', the AccuTrac Main Screen will be shown. Click 'ON' button to start.

8.7 Using Accutrac

During installation, Accutrac will place a shortcut on your start menu, as well as on your desktop. To launch Accutrac, use either of these shortcuts.

8.8 Main Screen

Upon start-up, Accutrac will open to the main data collection screen (Figure 6.7). This screen is set up in a spreadsheet format, and will collect the data during a collection run.

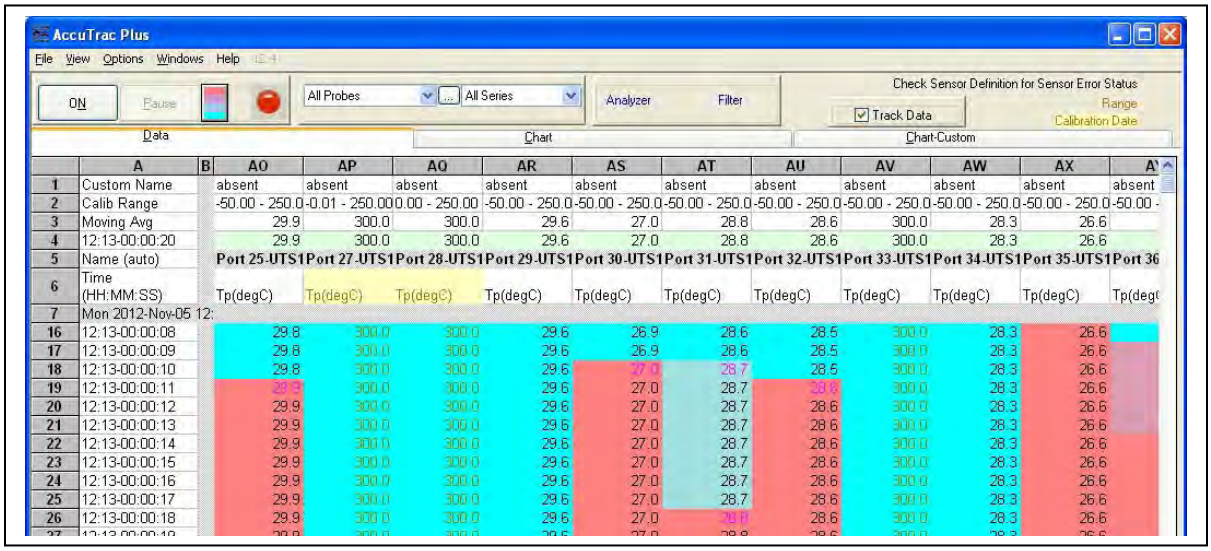
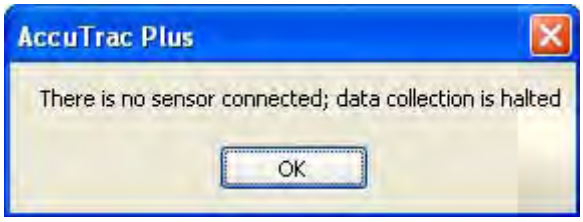


Figure 6.7: Main data collection screen

To begin a data collection run, click the “On” button. The Red “LED” will turn green, and data collection will begin. Clicking the “Pause” button during a data collection run will pause the data collection until the “On” button is clicked again.

8.9 Accutrac Functions

If no sensors are connected, Accutrac will not attempt to log data, and a pop-up window will warn you that there are no sensors connected. Please connect sensors before attempting to collect data.



Accutrac will identify which port on the ATM2400 hub a sensor is connected to. This is useful for tracking multiple data points, and can be used to identify multiple locations being monitored. If sensors are being monitored by Accutrac without the use of an ATM2400 hub, channel identification is not available.

If you unplug a sensor during logging or Accutrac loses connection to a sensor, data collection will continue for remaining connected senors. The missing sensor will still be identified in the data log, however, no data will be collected or charted for this sensor until Accutrac recovers the connection to the sensor, or the sensor is reconnected to the hub.

If all connected sensors are unplugged during data logging, Accutrac will continue to log the time stamp, but not display any data. Sensors will continue to be identified in the log, and data logging will resume when at least one of the sensors is reconnected to the hub. Turning the ATM2400 hub off during data collection will cause similar results in the data log. Data collection will again resume when the ATM2400 is turned back on.

If a faulty sensor is connected to the ATM2400, and an attempt is made to start data logging, the faulty sensor will not appear in the data collection log. Data collection will continue on any functioning sensors connected to the hub.

A sensor could be faulty for several reasons, ie.: Malfunctioning equipment, corrupted configuration data in the sensors memory, or a bad connection to the USB hub. Attempt to reconnect the sensor to the hub, or to a different port, to verify that the issue is not a bad connection. Any other issues with sensors will require the sensors to be returned to Degree Controls, for repair. Please contact your Degree Controls representative.

Degree Controls does not recommend connecting new sensors to the hub during a data collection run. If a new sensor needs to be connected, the user should stop the data run and save the file to disk; then connect the new sensor, and begin a new data collection run.

When you unplug and plug the sensors while the Accutrac is running there may be a chance of not recognition. So do not plug or unplug the sensors during the data collection.

NOTE: Power cycle will not have any effect on the inclusion/deletion of sensor columns in Accutrac display. The display will solely depend on the status of hub and sensors on pressing „ON" button in Accutrac.

In detail:

1) Whatever sensors are connected at the time of clicking „ON" button will be sorted and displayed in ascending order of hub port number, or as per serial lookup file, as the case may be, and saved to excel in that same order.

2) Sensors connected during the reading process will be ignored (If to include, press „OFF" button and „ON" button again in Accutrac). You can press Alt+R to restart without saving the data.

3) Sensors physically removed while the reading process is on, will show blank in the corresponding columns, until user „OFF" and „ON" in Accutrac. On doing that, columns correponding to the removed sensors will be removed from the display.

If a non-Degree Controls USB device is plugged into an ATM2400 hub, Accutrac will not log data from the device. It is not recommended to connect non-Degree Controls devices to the ATM2400 hub.

NOTE: If Accutrac hangs during operation, power off and on the ATM2400 hub. If the problem persists, you will need to remove the executable from the Windows Task Manager, and restart the application. If Accutrac does not recover, try rebooting your computer. If you continue to have problems, please contact Degree Controls technical support.

Clicking the "Chart" tab will show you a real time updating chart of the data you are collecting (Figure 6.8).

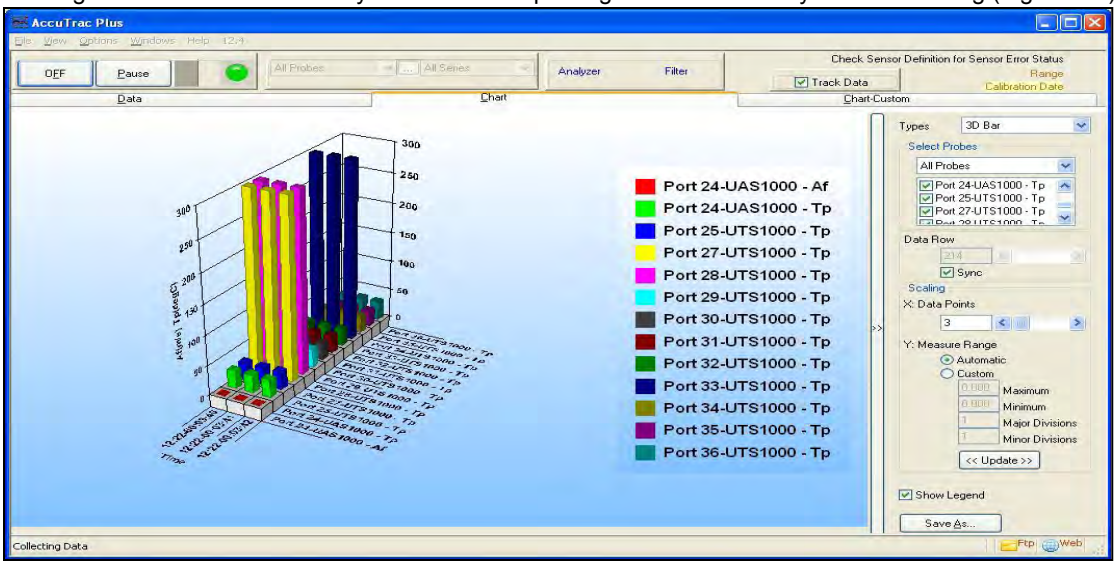
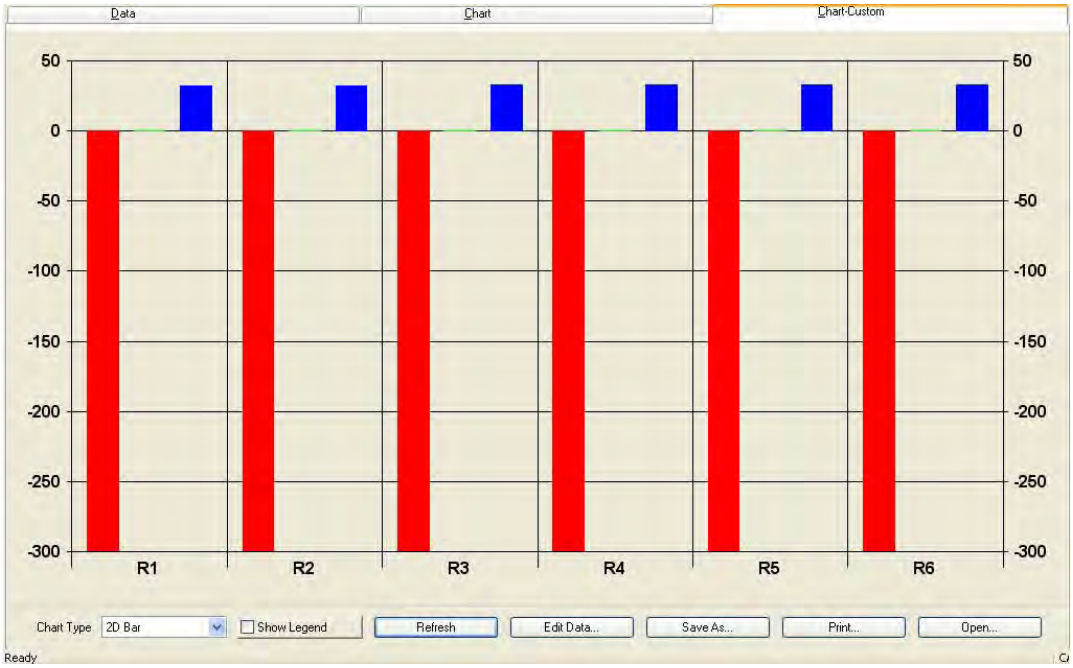


Figure 6.8: Chart screen

On the "Chart" screen, you can select four different types of charts to display data: 2D line chart, 2D bar chart, 3D line chart, or 3D bar chart. You can select specific probes to display data from, based on their probe identification, or you can view only airflow probes, only thermocouple probes, or select all probes to view data from all probes connected to the system.

In the scaling section you can select the number of data points to view on the graph (x-axis), and the maximum value to display on the y-axis. Or, select AutoSet, to allow Accutrac to automatically set the y-axis during graphing.

Clicking “Chart-Custom” you can plot a chart on a random selection of datasheet readings.

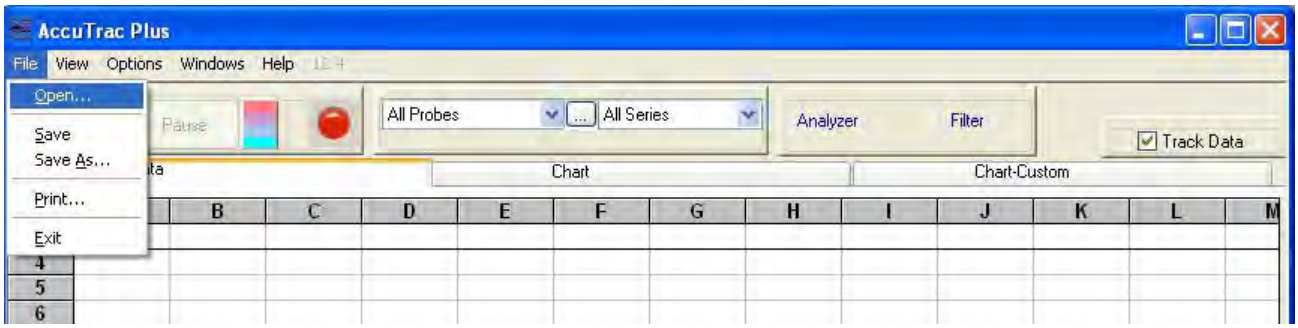


On Custom-Chart screen you can select a wide variety of chart types to plot the graph also you can show chart legend and can edit the legend in 'Edit Data'.

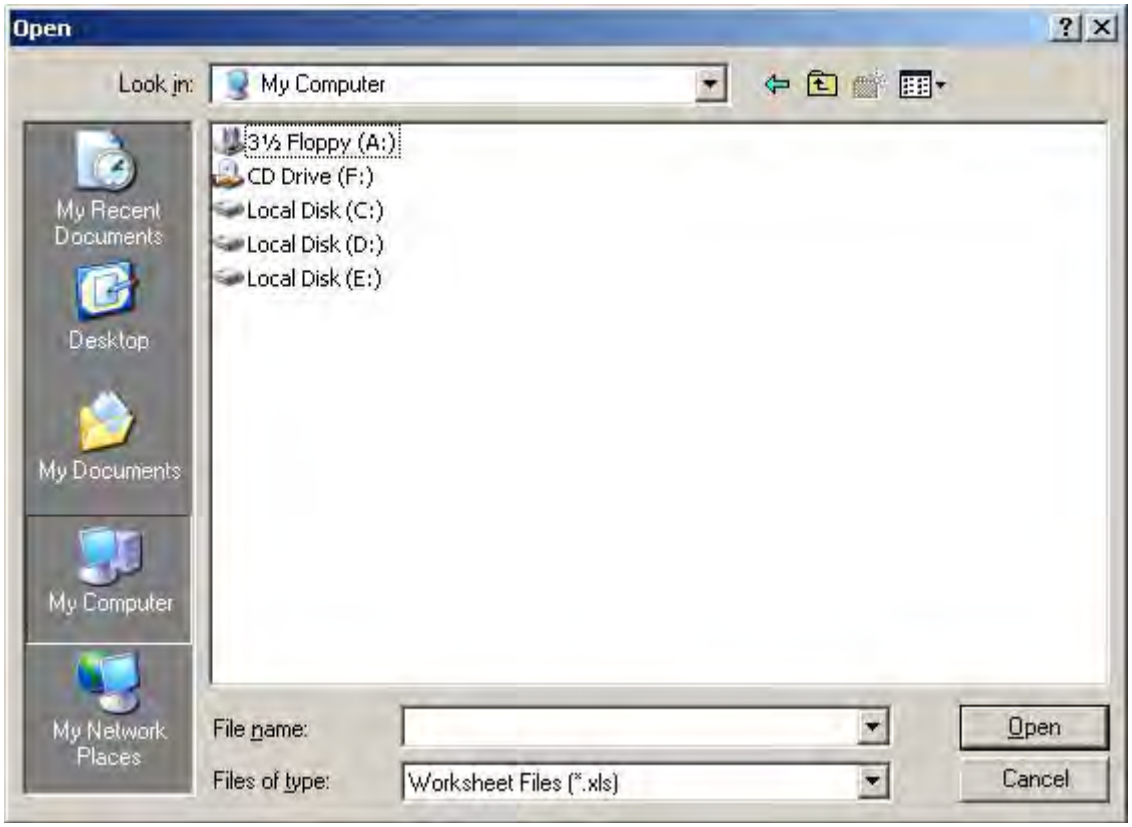
8.10 Menu Bar

The menu bar at the top of the screen provides access to all of the features of Accutrac plus.

8.11 File Menu

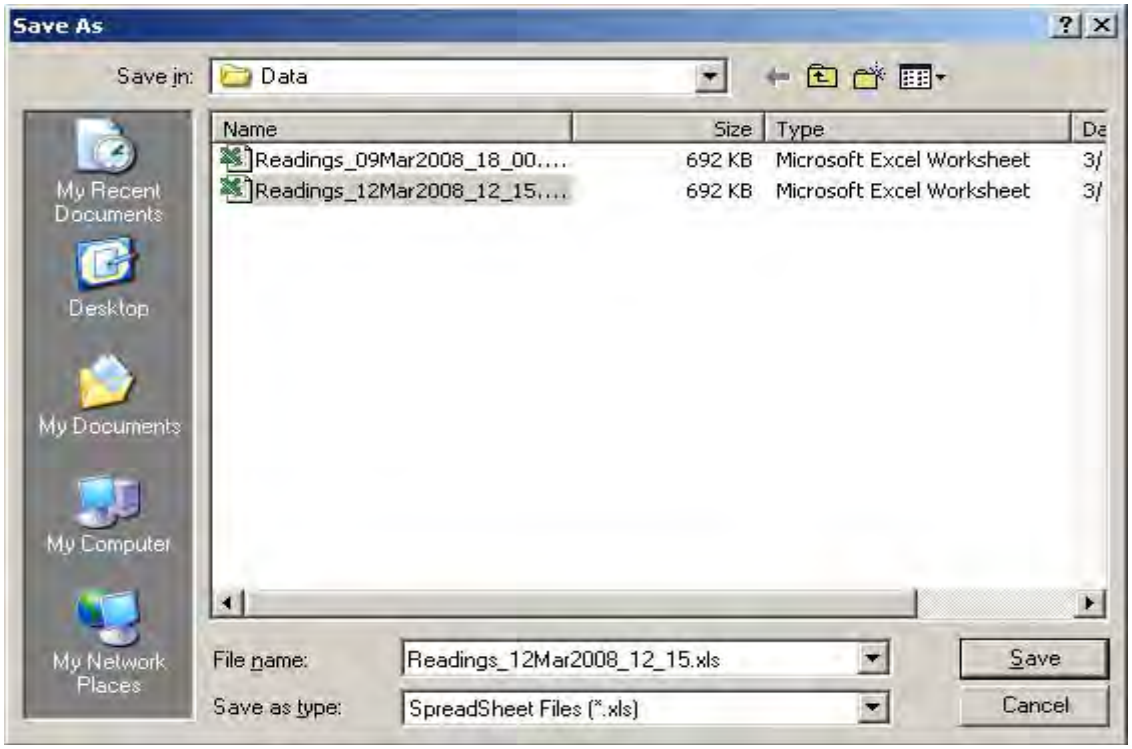


Open: Opens an existing data collection file (*.xls) from disk

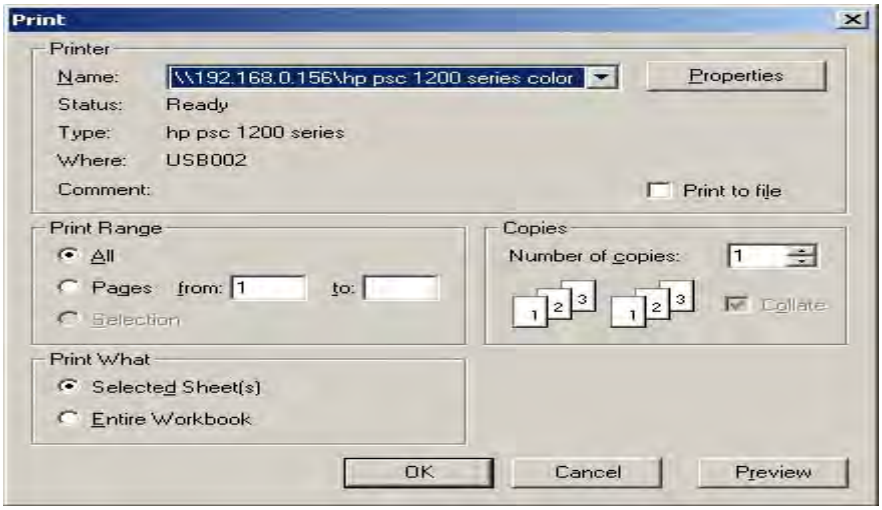


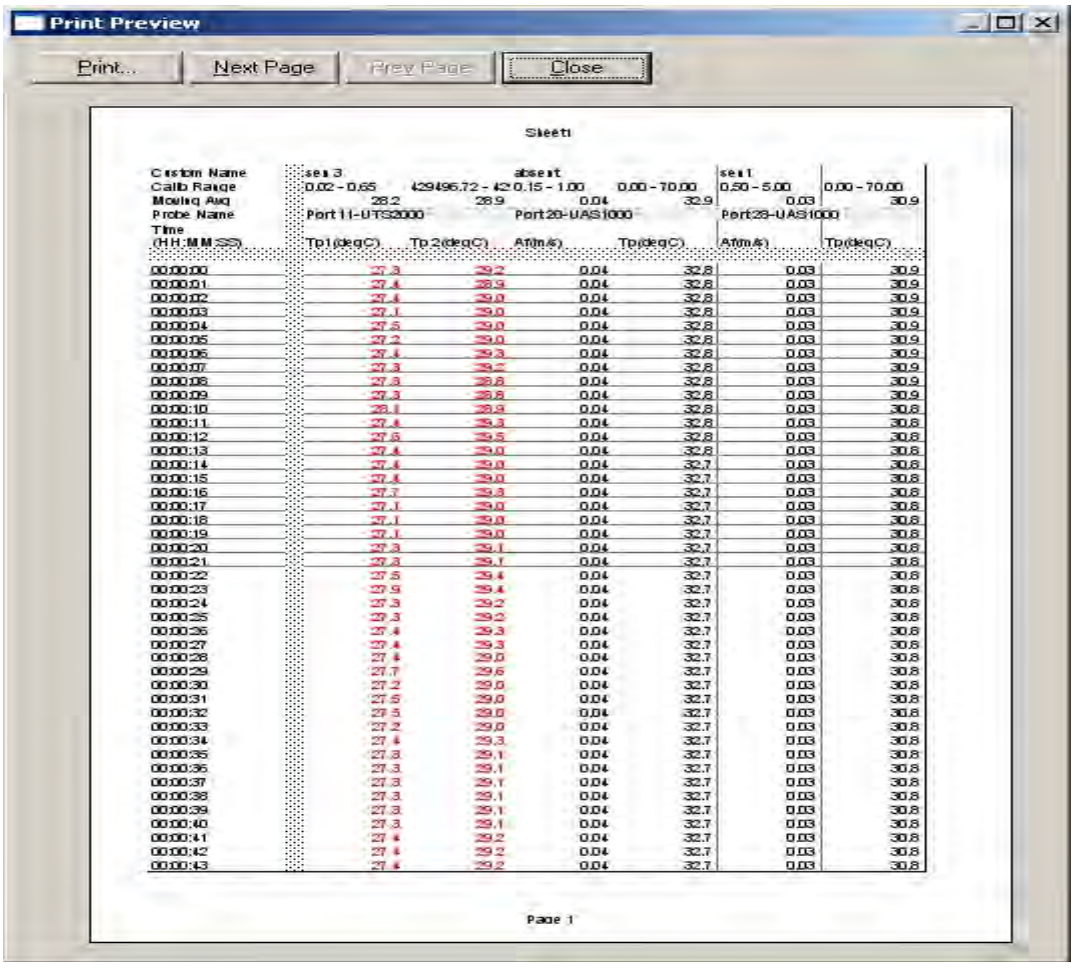
Save: Stores the current spreadsheet to disk under the current file name

Save As: Saves the current spreadsheet to disk under a user assignable name and directory.



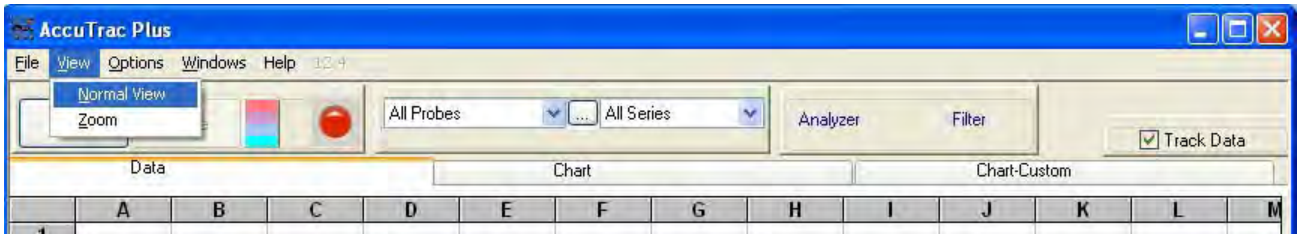
Print: Allows the user to print the current spreadsheet or chart as displayed.





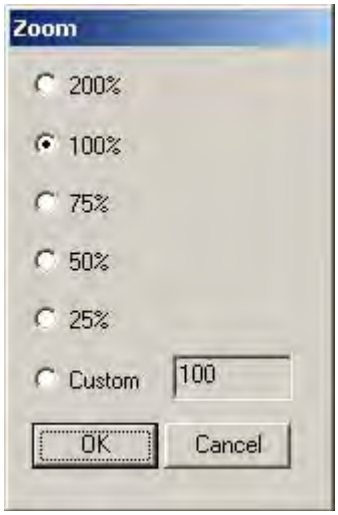
Exit: Closes Accutrac.

8.12 View Menu

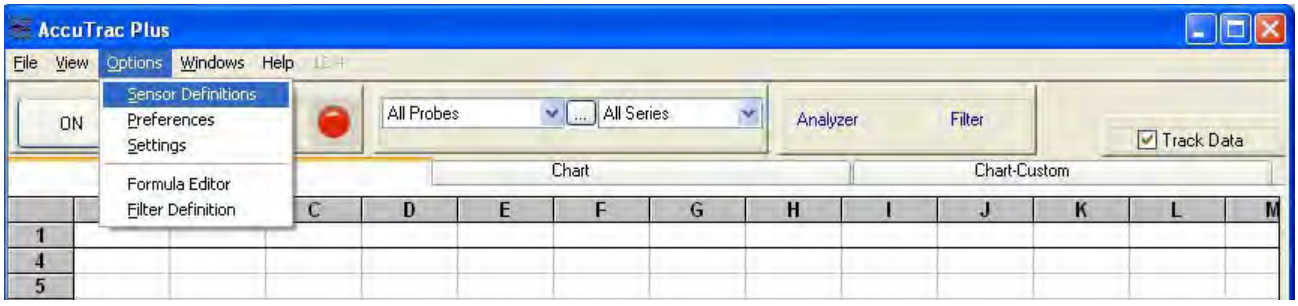


Normal View: Allows you to view the spreadsheet in normal mode.

Zoom View: Allows you to zoom in on the spreadsheet view.

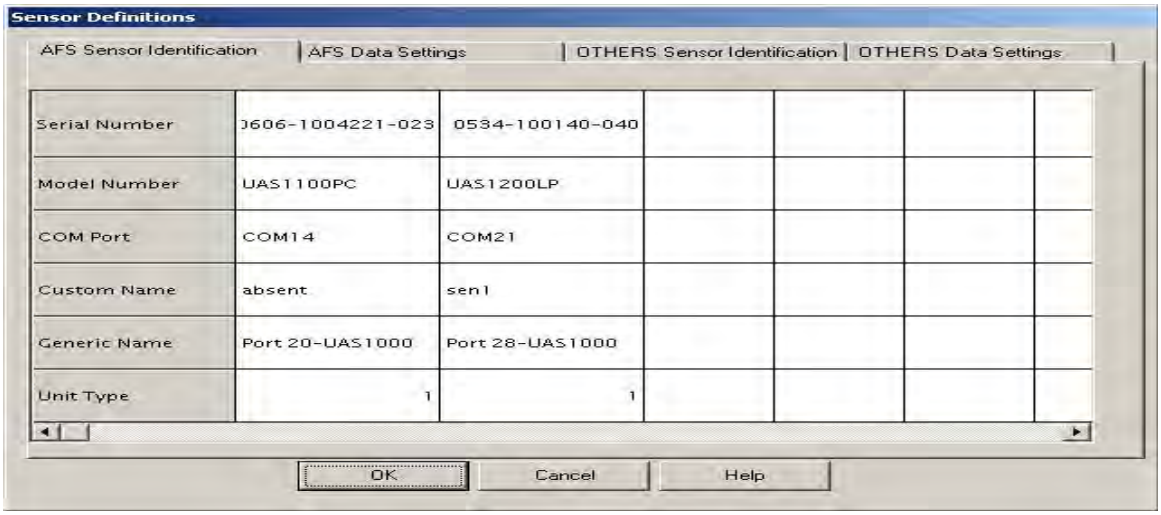


8.13 Options Menu

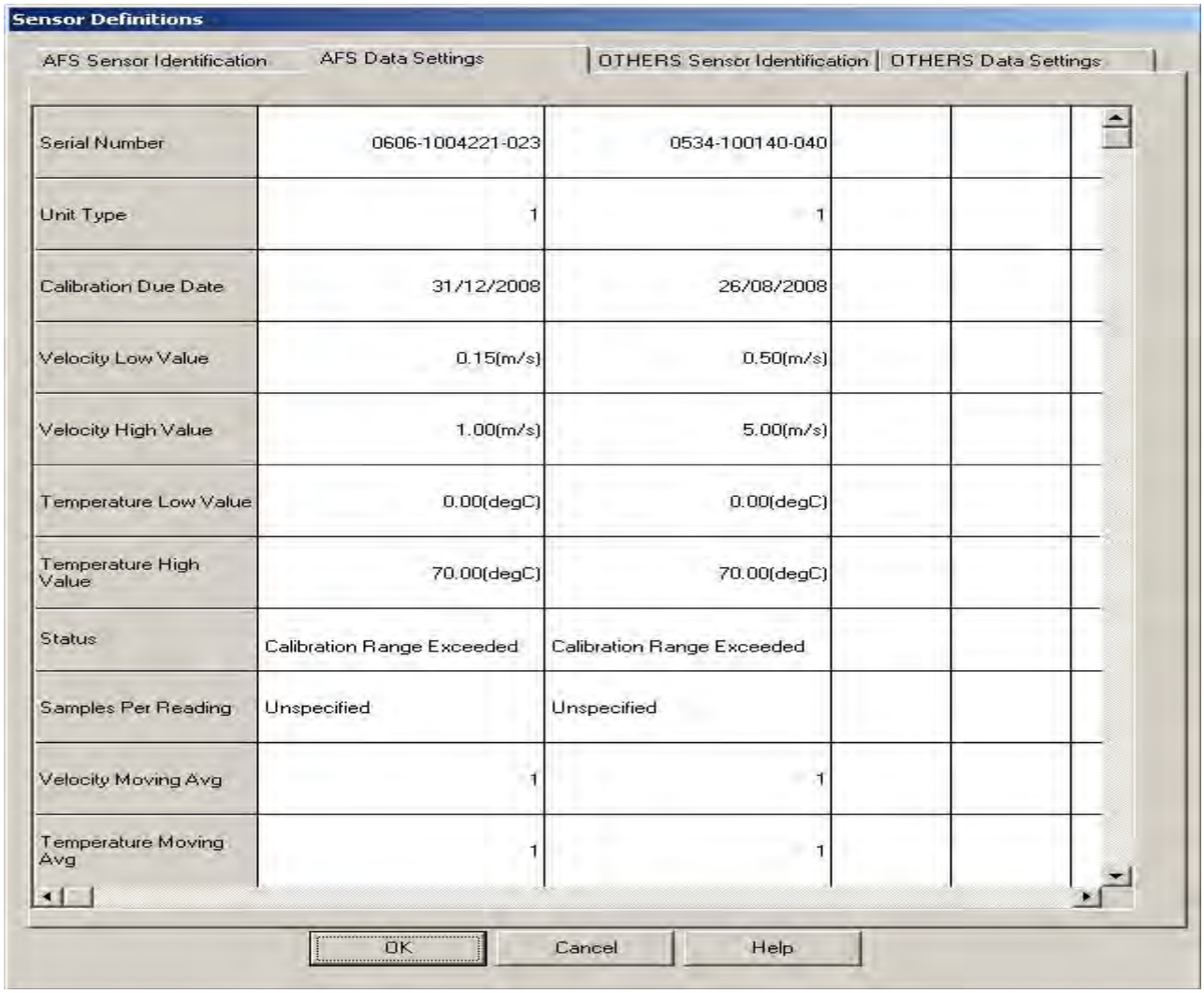


Sensor Definitions: Allows you to view sensor information contained in the sensor memory.

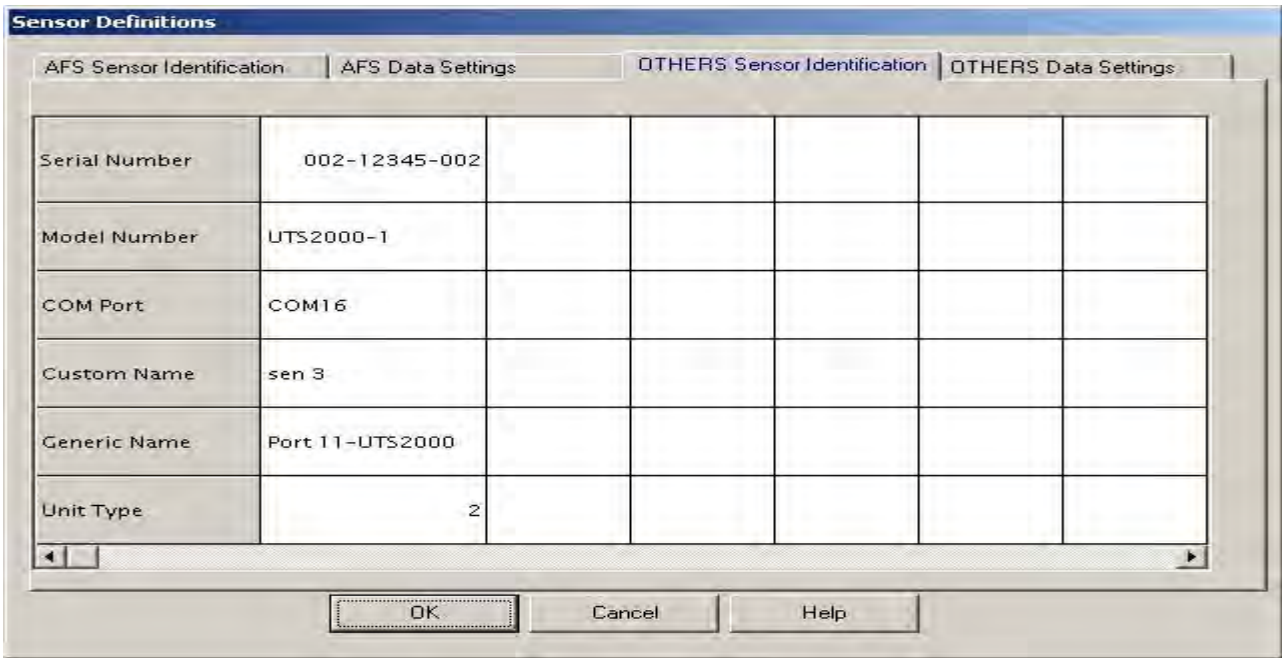
- **AFS Sensor Identification**: Allows you to view sensor Serial number, model number, COM port assigned, the Custom Name, the Generic name, and the type of Unit.

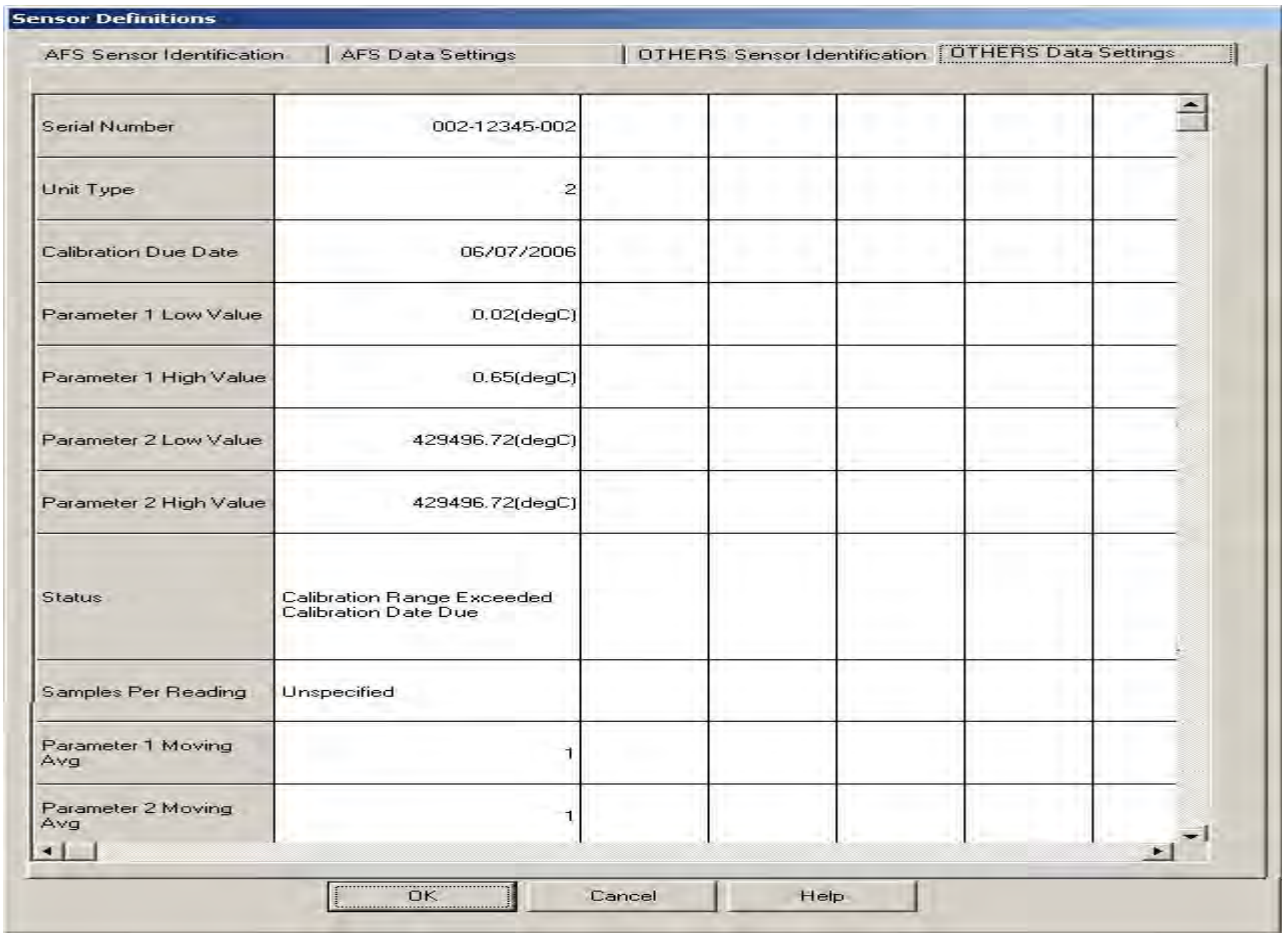


- **AFS Data Settings**: Allows you to view the data settings for the sensors. The information that can be viewed is: Serial Number, Unit Type, Calibration Due Date, Velocity low and high values, Temperature low and high values, current Status, number of samples per reading, the Velocity moving average, and the temperature moving average. Some of these settings can be changed in the Preferences Menu.



- **Other Sensor Identification and Data Settings**: These tabs allow you to view the same information as the AFS views, but for other sensor types connected to the system.





NOTE: To give the Custom name to the sensors go to either AFS Sensor Identification or Other Sensor Identification tabs and click in the Custom name box and edit it with a meaningful name. This name will stay all the time.

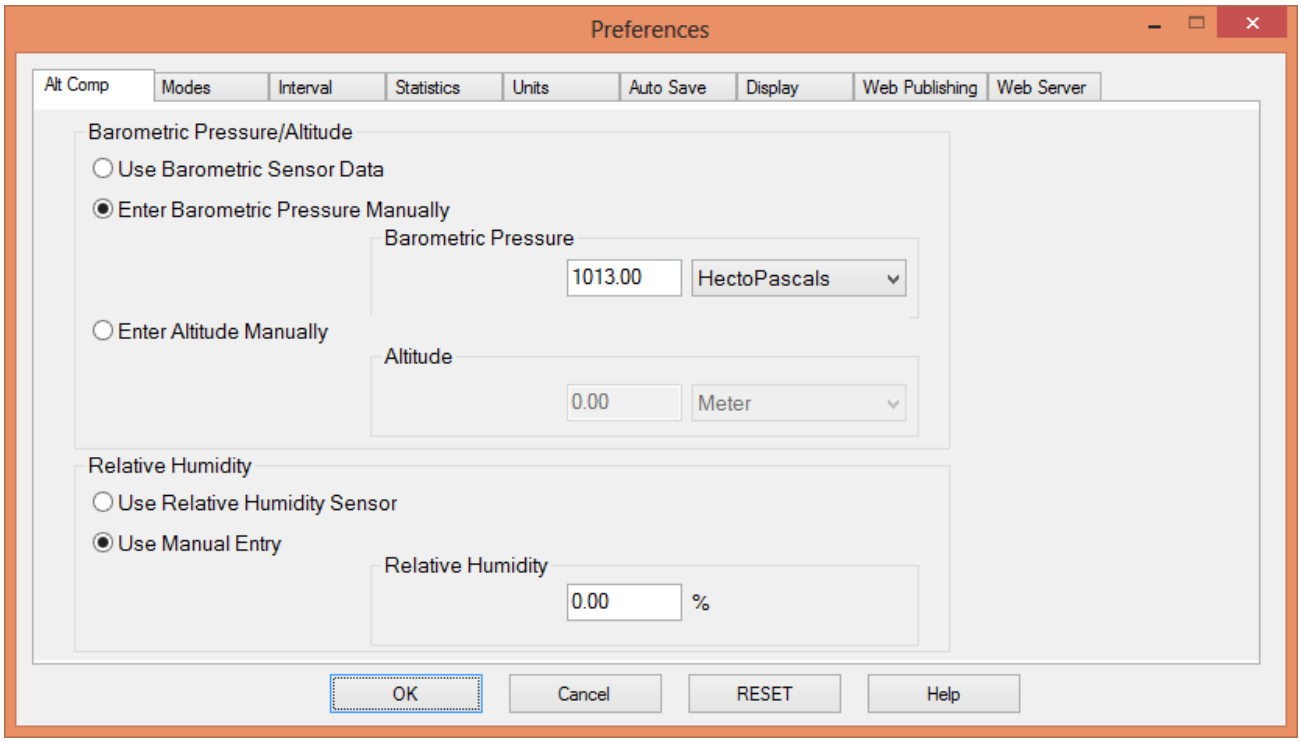
Preferences

The Preferences screen (Figure 6.13) allows you to set a number of different parameters for your data collection.

- **Altitude Compensation Tab**

The Altitude Compensation tab allows you to enter barometric pressure information or altitude information manually, to allow your airflow sensor to compensate for air density changes at varying altitudes. You are also able to set the relative humidity manually, for the same purposes. In the future, humidity and barometric pressure sensors will be integrated into the ATM2400 product family, and you will be able to use data from these sensors for air density compensation.

Click OK to save your settings. Click Cancel to exit the Preferences Screen, or hit RESET to reset the pressure and humidity settings to the default settings (1013.32 inHg, and 0.00% RH).



- **Modes Tab**

The Modes Tab allows you to change the method of data collection. The following options are available:

Start and run until Stop: Allows you to control start and stop of data collection with the “On” and “Pause” buttons on the main screen.

Start, take one reading with every keystroke: Start data collection with the “On” button, and with every key stroke on your keyboard, a data point will be collected.

Start, run for: Allows you to set a time frame to run the data collection in Hours, Minutes, and Seconds.

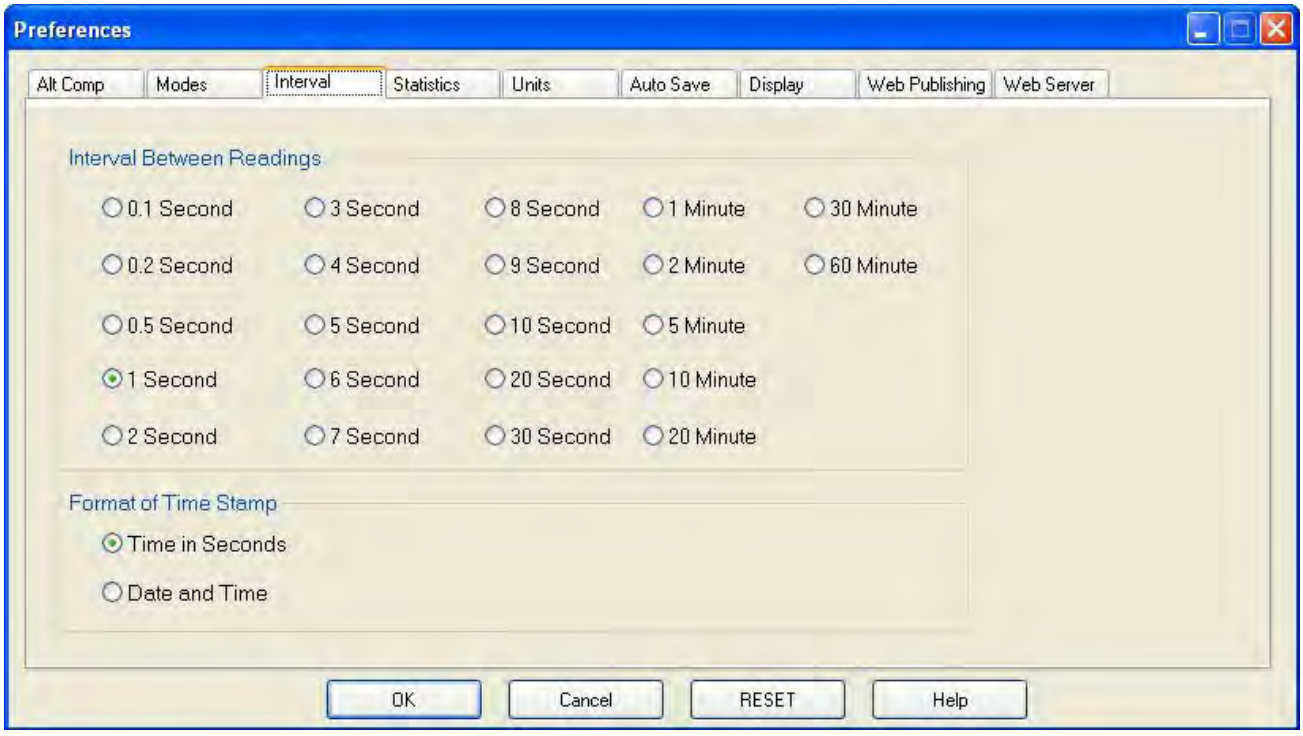
Start At/Stop At: Allows you to schedule a start and stop time and date for data collection to run.

Click OK to save your settings. Click Cancel to exit the Preferences Screen, or hit RESET to reset the default settings (Stat, and run until Stop).

- **Interval Tab**

The Interval Tab allows you to set the time between readings from the sensors. You can also elect to change the format of the time stamp in the spreadsheet from the default (time in seconds) to a full date and time stamp.

Click OK to save your settings. Click Cancel to exit the Preferences Screen, or hit RESET to reset the default settings of 1 second between readings, and time stamp displayed in seconds.



- **Statistics Tab**

The Statistics tab allows you to change the statistical averaging used and displayed on the chart screen. You can select between:

Average: The Average over all readings per sensor taken since session start.

Minimum: Displays the Minimum of all readings taken per sensor since session start.

RMS/Average: Calculates the Root Means Square divided by Average over all readings taken per sensor since session start.

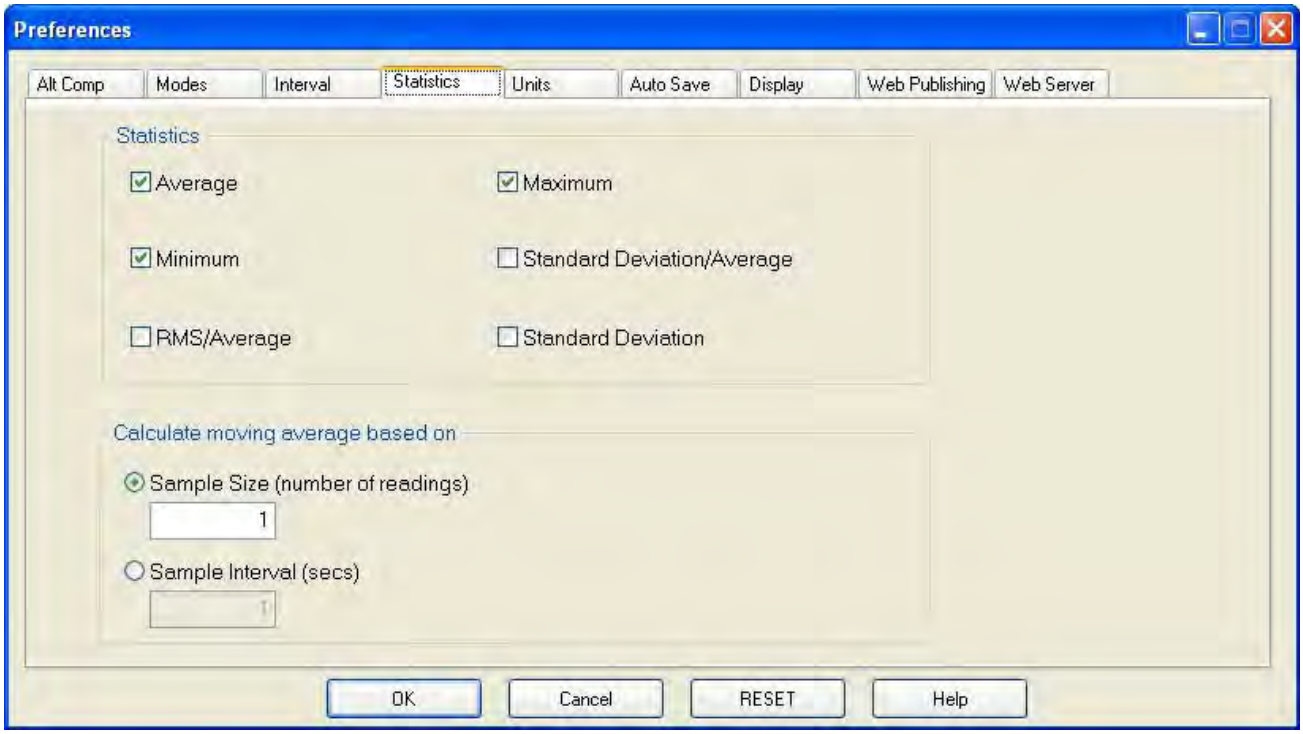
Maximum: Displays the Maximum of all readings taken per sensor since session start.

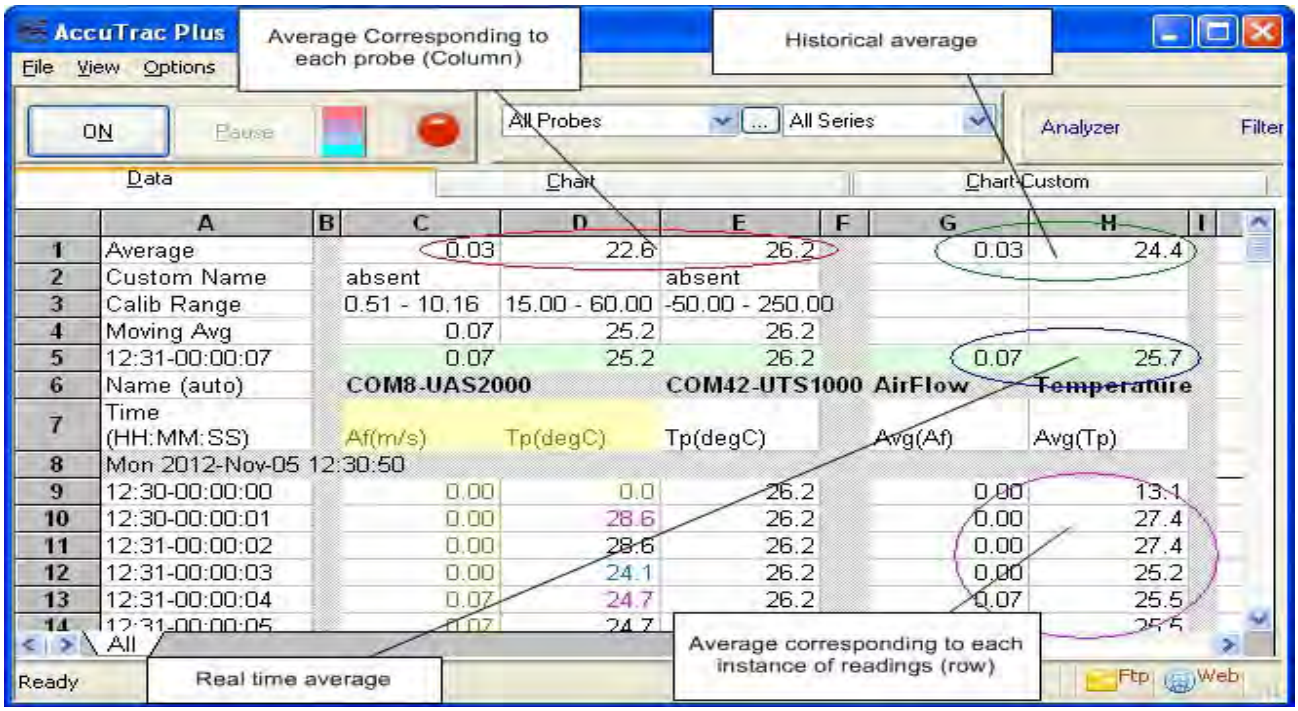
Standard Deviation/Average: calculates the Standard Deviation divided by Average over all readings taken per sensor since session start. This value is called Turbulence Intensity, and is an indication for turbulent or laminar flow**. NOTE**: Turbulence Intensity calculated on air temperature and thermocouple readings are meaningless and should be ignored.

Standard Deviation: calculates the Standard Deviation over all readings taken per sensor since session start.

Calculate moving average based on: Allows you to set the calculation of moving average based on sample size (number of readings) or on sample interval (in seconds).

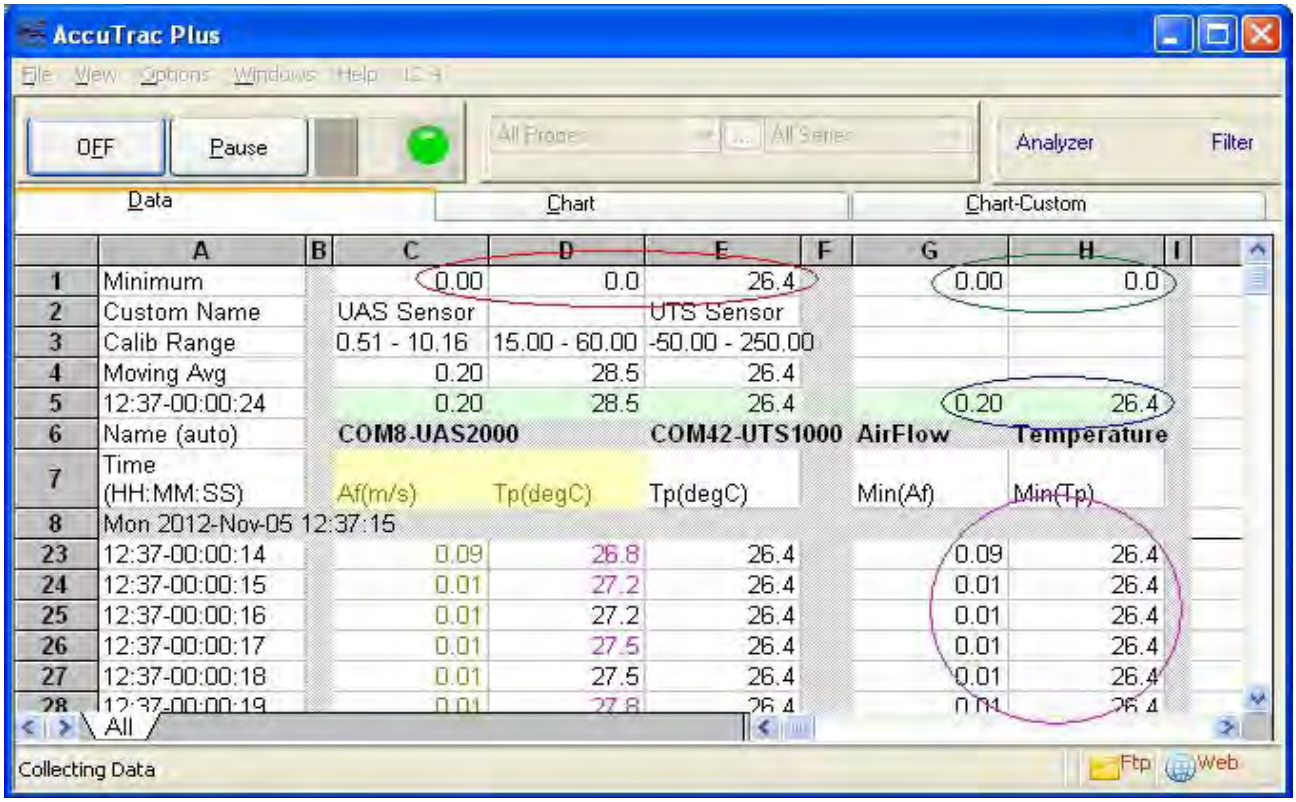
Click OK to save your settings. Click Cancel to exit the Preferences Screen, or hit RESET to reset the default setting (none).





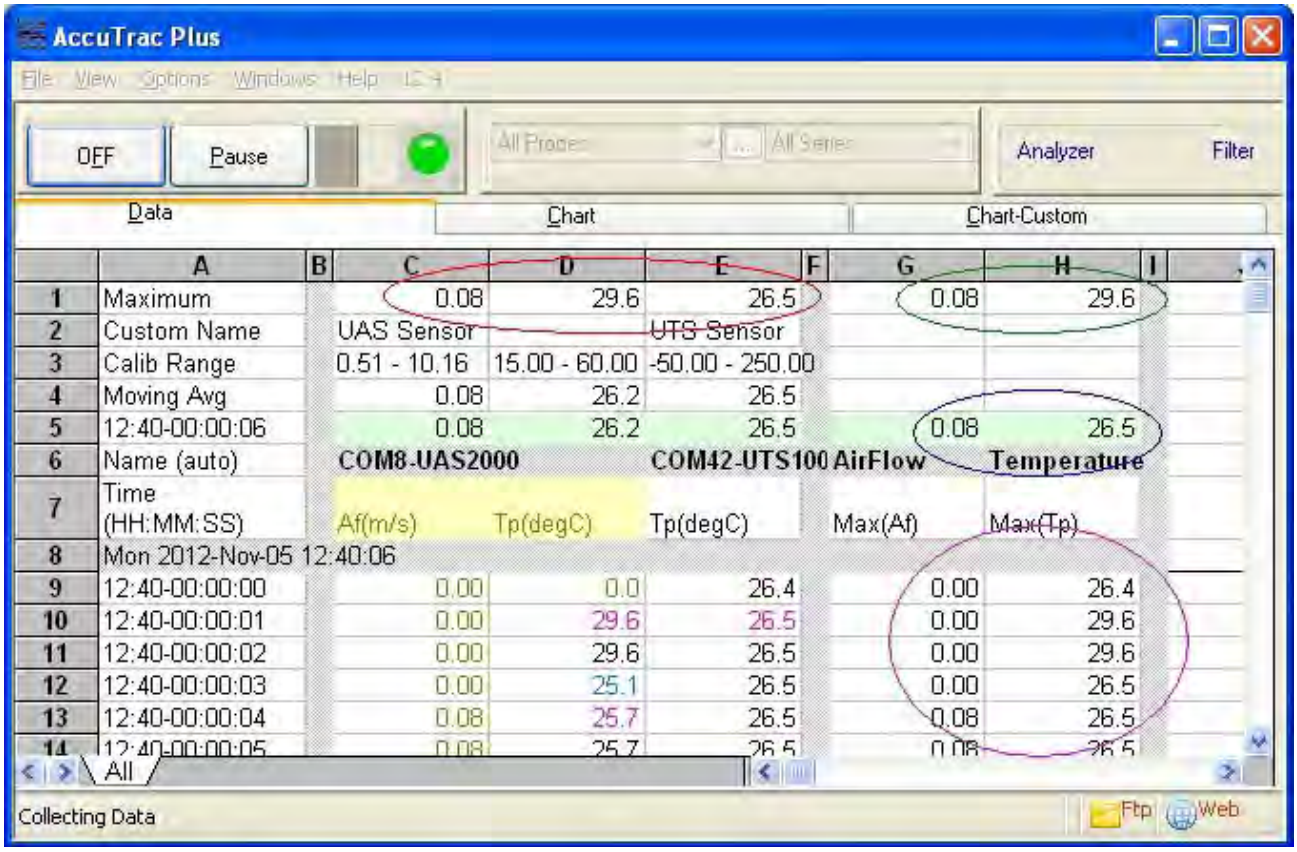
	A	B	C	D	E	F	G	H	I
1	Average		0.03	22.6	26.2		0.03	24.4	
2	Custom Name		absent		absent				
3	Calib Range		0.51 - 10.16	15.00 - 60.00	-50.00 - 250.00				
4	Moving Avg		0.07	25.2	26.2				
5	12:31-00:00:07		0.07	25.2	26.2		0.07	25.7	
6	Name (auto)		COM8-UAS2000		COM42-UTS1000		AirFlow	Temperature	
7	Time (HH:MM:SS)		Af(m/s)	Tp(degC)	Tp(degC)		Avg(Af)	Avg(Tp)	
8	Mon 2012-Nov-05 12:30:50								
9	12:30-00:00:00		0.00	0.0	26.2		0.00	13.1	
10	12:30-00:00:01		0.00	28.6	26.2		0.00	27.4	
11	12:31-00:00:02		0.00	28.6	26.2		0.00	27.4	
12	12:31-00:00:03		0.00	24.1	26.2		0.00	25.2	
13	12:31-00:00:04		0.07	24.7	26.2		0.07	25.5	
14	12:31-00:00:05		0.07	24.7				25.5	

Statistical Information: Average of each probe in the top row; that of each sensor type in the right columns



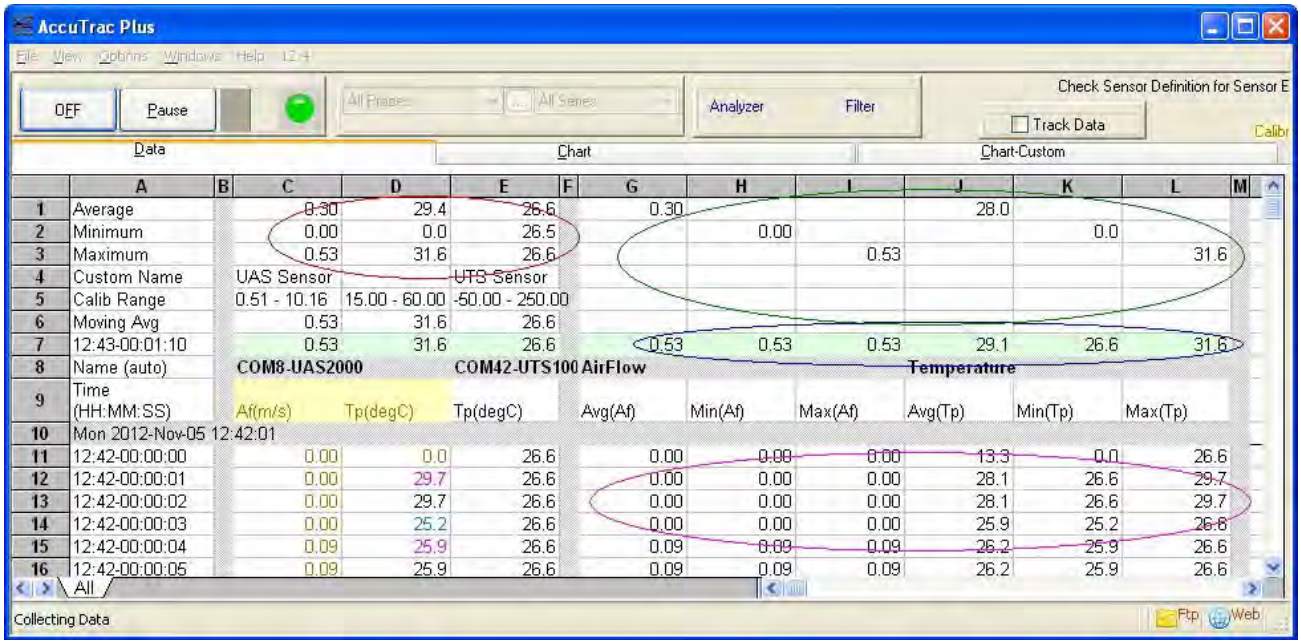
	A	B	C	D	E	F	G	H	I
1	Minimum		0.00	0.0	26.4		0.00	0.0	
2	Custom Name		UAS Sensor		UTS Sensor				
3	Calib Range		0.51 - 10.16	15.00 - 60.00	-50.00 - 250.00				
4	Moving Avg		0.20	28.5	26.4				
5	12:37-00:00:24		0.20	28.5	26.4		0.20	26.4	
6	Name (auto)		COM8-UAS2000		COM42-UTS1000		AirFlow	Temperature	
7	Time (HH:MM:SS)		Af(m/s)	Tp(degC)	Tp(degC)		Min(Af)	Min(Tp)	
8	Mon 2012-Nov-05 12:37:15								
23	12:37-00:00:14		0.09	26.8	26.4		0.09	26.4	
24	12:37-00:00:15		0.01	27.2	26.4		0.01	26.4	
25	12:37-00:00:16		0.01	27.2	26.4		0.01	26.4	
26	12:37-00:00:17		0.01	27.5	26.4		0.01	26.4	
27	12:37-00:00:18		0.01	27.5	26.4		0.01	26.4	
28	12:37-00:00:19		0.01	27.8	26.4		0.01	26.4	

Statistical Information: Minimum of each probe in the top row; that of each sensor type in the right columns



	A	C	D	E	G	H
1	Maximum	0.08	29.6	26.5	0.08	29.6
2	Custom Name	UAS Sensor		UTS Sensor		
3	Calib Range	0.51 - 10.16	15.00 - 60.00	-50.00 - 250.00		
4	Moving Avg	0.08	26.2	26.5		
5	12:40-00:00:06	0.08	26.2	26.5	0.08	26.5
6	Name (auto)	COM8-UAS2000		COM42-UTS100 AirFlow		Temperature
7	Time (HH:MM:SS)	Af(m/s)	Tp(degC)	Tp(degC)	Max(Af)	Max(Tp)
8	Mon 2012-Nov-05 12:40:06					
9	12:40-00:00:00	0.00	0.0	26.4	0.00	26.4
10	12:40-00:00:01	0.00	29.6	26.5	0.00	29.6
11	12:40-00:00:02	0.00	29.6	26.5	0.00	29.6
12	12:40-00:00:03	0.00	25.1	26.5	0.00	26.5
13	12:40-00:00:04	0.08	25.7	26.5	0.08	26.5
14	12:40-00:00:05	0.08	25.7	26.5	0.08	26.5

Statistical Information: Maximum of each probe in the top row; that of each sensor type in the right columns



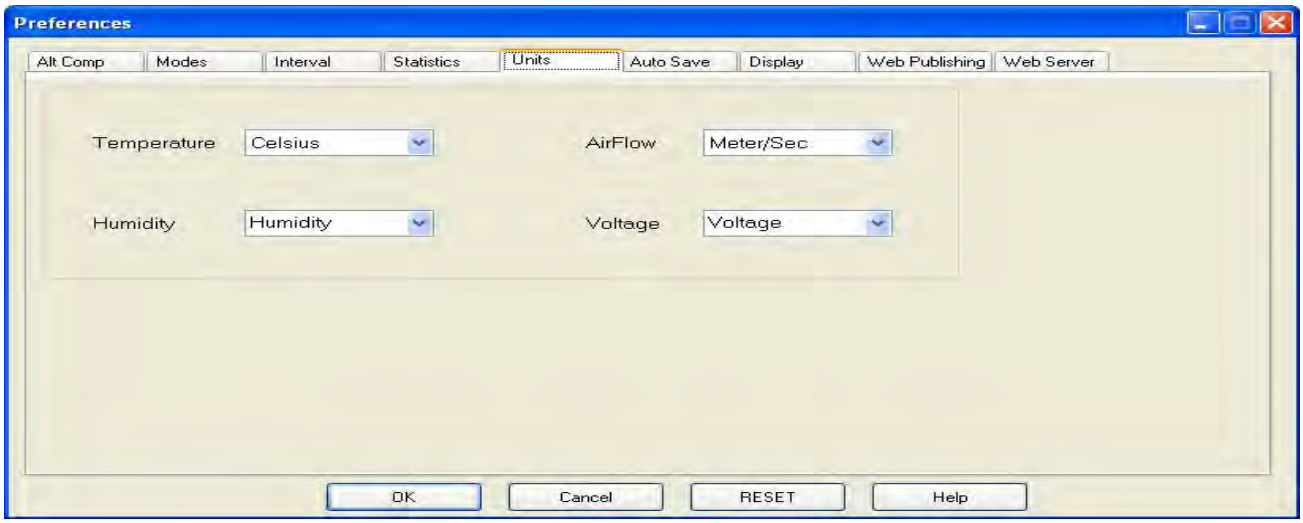
	A	C	D	E	G	H	I	J	K	L
1	Average	0.30	29.4	26.6	0.30			28.0		
2	Minimum	0.00	0.0	26.5		0.00			0.0	
3	Maximum	0.53	31.6	26.6			0.53			31.6
4	Custom Name	UAS Sensor		UTS Sensor						
5	Calib Range	0.51 - 10.16	15.00 - 60.00	-50.00 - 250.00						
6	Moving Avg	0.53	31.6	26.6						
7	12:43-00:01:10	0.53	31.6	26.6	0.53	0.53	0.53	29.1	26.6	31.6
8	Name (auto)	COM8-UAS2000		COM42-UTS100 AirFlow				Temperature		
9	Time (HH:MM:SS)	Af(m/s)	Tp(degC)	Tp(degC)	Avg(Af)	Min(Af)	Max(Af)	Avg(Tp)	Min(Tp)	Max(Tp)
10	Mon 2012-Nov-05 12:42:01									
11	12:42-00:00:00	0.00	0.0	26.6	0.00	0.00	0.00	13.3	0.0	26.6
12	12:42-00:00:01	0.00	29.7	26.6	0.00	0.00	0.00	28.1	26.6	29.7
13	12:42-00:00:02	0.00	29.7	26.6	0.00	0.00	0.00	28.1	26.6	29.7
14	12:42-00:00:03	0.00	25.2	26.6	0.00	0.00	0.00	25.9	25.2	26.6
15	12:42-00:00:04	0.09	25.9	26.6	0.09	0.09	0.09	26.2	25.9	26.6
16	12:42-00:00:05	0.09	25.9	26.6	0.09	0.09	0.09	26.2	25.9	26.6

Statistical Information: Average, Minimum, Maximum of each probe in the top row; that of each sensor type grouped in the right columns

- **Units Tab**

The units tab allows you to select different engineering units to display your data in. Temperature may be displayed in Degrees Celsius, Degrees Farenheit, or Kelvin. Airflow may be displayed in either meters/second, or feet/minute.

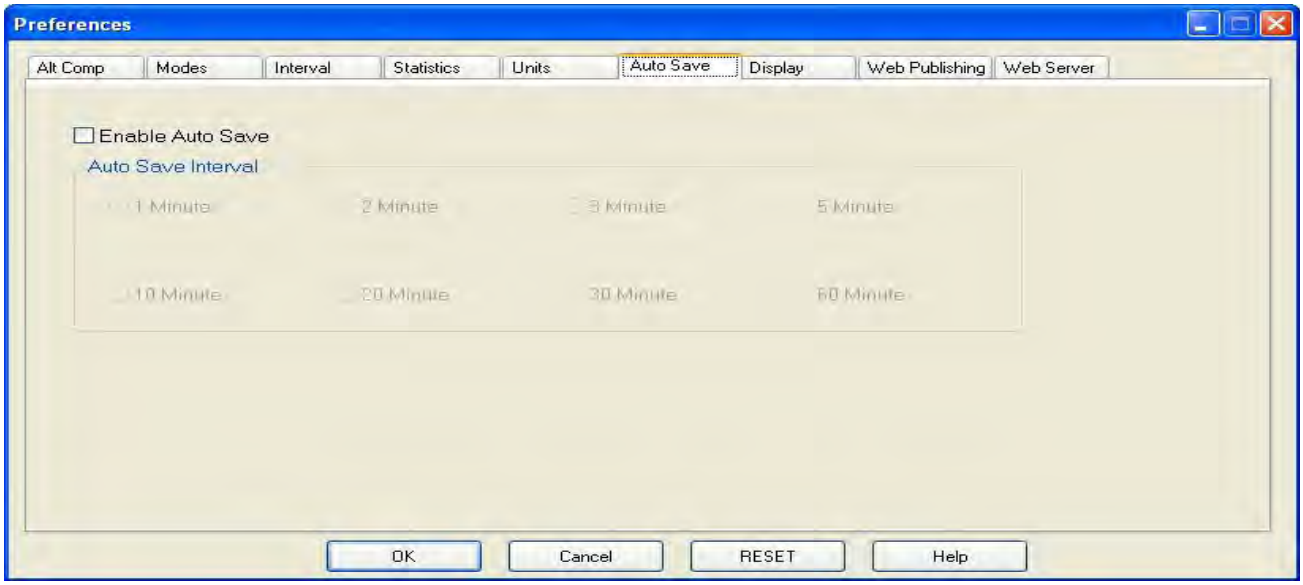
Click OK to save your settings. Click Cancel to exit the Preferences Screen, or hit RESET to reset the default values (Degrees Celsius, and meters/second).



- **Autosave Tab**

The Autosave Tab allows you to select the autosave feature. When the autosave feature is selected, Accutrac will automatically save the data collected to hard disk at user definable intervals. The intervals available are 1, 2, 3, 5, 10, 20, 30, and 60 minutes.

Click OK to save your settings. Click Cancel to exit the Preferences Screen, or hit RESET to reset the default setting (Autosave disabled).



- **Display Tab**

The Display tab allows you to select the data that is displayed in the data collection spreadsheet.

Display: Allows you to select to display the sensor serial number, model number, calibration date, calibration range, or custom name. Or any combination of these options.

Sorting: Allows you to sort the spreadsheet column display either by port number or by serial number lookup file SensorConfig.cfg in C:\AccuTrac folder.

NOTE: SensorConfig.cfg has the following format:

0613-79638-019::sensor1
0618-1007201-024::senx
0618-1007201-007::absent

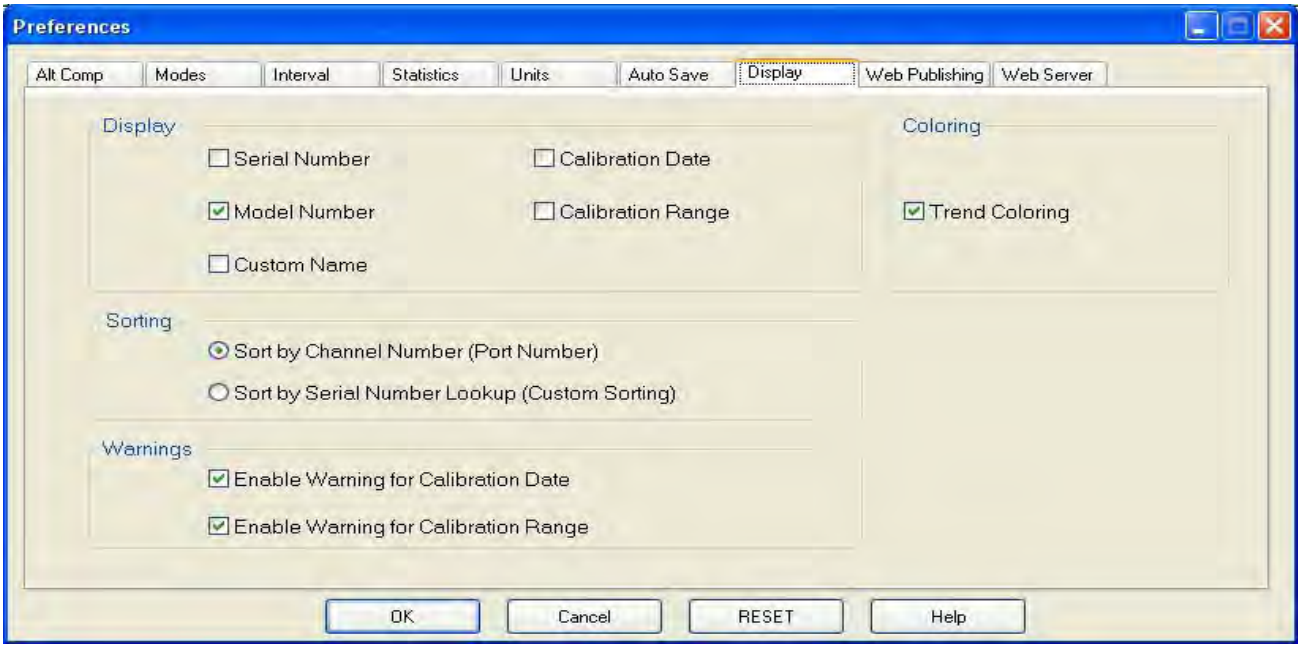
where the part before :: is the serial number and that after :: is the custom sensor name. You can move the lines up or down in this file. The sensor columns will be displayed in this order, if you opts for „sort by serial number" in Sorting. Whenever user places a sensor in ATM2400 and press ON, it will be added to this file with custom name set as „absent". You can change the custom name in „Sensor Definition" screen.

Warnings: Allows you to select to enable warnings for Calibration Date and Calibration Range. When these options are selected, Accutrac™ will display warnings when sensors are past their calibration date, or when readings are outside of the sensor calibrated ranges.

Click OK to save your settings. Click Cancel to exit the Preferences Screen, or hit RESET to reset the default settings (no Display data, Generic Probe name, and both warnings enabled).

NOTE: After all the preferences were made, when you press reset in one particular page all the other preferences will be reset to the default settings.

Coloring: Enable/disable the colouring of readings according to trend, by checking/unchecking Trend Colouring in Colouring group. LIGHT BLUE denotes a decrease from normal (of neighbourhood) , and PINK, an upward trend, BLACK being normal.



Click OK to save your settings. Click Cancel to exit the Preferences Screen, or hit RESET to reset the default settings (no Display data, Generic Probe name, and both warnings enabled).

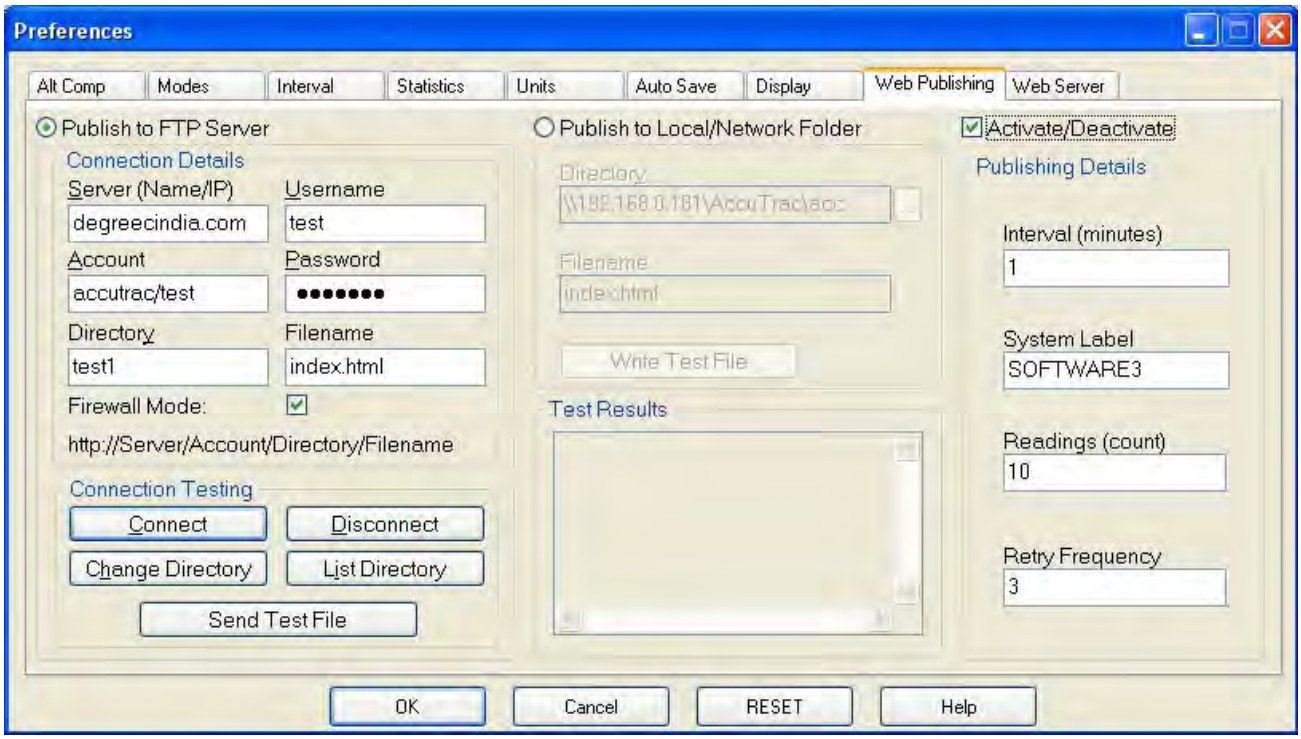
- **Web Publishing Tab**

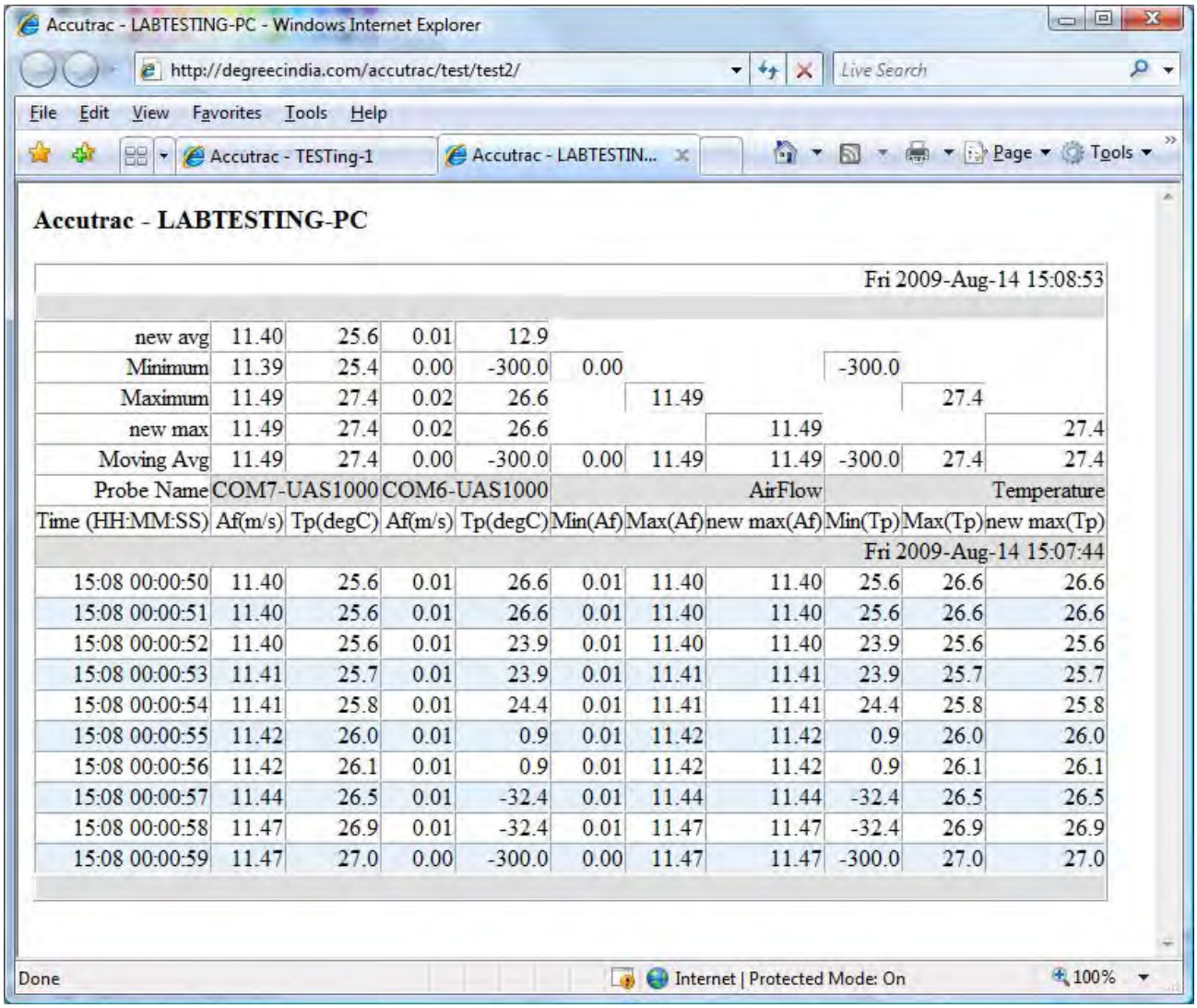
  If web publishing functionality is activated, the latest snapshot of readings will be generated based on the user settings, and will be uploaded to a web-accessible location in intranet/Internet, to a shared folder in the current system or to a publically accessible shared location in the local network.

NOTE: In addition to giving the connection details, you have to enable (Activate) web publishing as in the screenshot's RHS so that it will work when the reading process is started next time.

NOTE: If web publishing or web server functionality is enabled, readings will be automatically saved to a timed Excel file in '[System Drive(may be C:]\AccuTrac\History' folder and spreadsheet will be cleared (on the reach of each 16384 readings). But if auto-saving is specified, readings will be saved to a time stamped file in the selected auto-save folder. This is to make sure that the spreadsheet will not be full and the readings process will not halt, prompting the user to save the readings.

NOTE: A set of sample connection details are given at the bottom of the page, which you can use for testing purposes. Use separate folders (test1/test2/test3/test4) or create separate folders or use separate filenames (other than index.html, if publishing to the same folder), if you are testing more than one publishing simultaneously.





Accutrac - LABTESTING-PC - Windows Internet Explorer

http://degreecindia.com/accutrac/test/test2/

Live Search

File Edit View Favorites Tools Help

Accutrac - TESTing-1 | Accutrac - LABTESTIN... | Page | Tools

Accutrac - LABTESTING-PC

Fri 2009-Aug-14 15:08:53

new avg	11.40	25.6	0.01	12.9						
Minimum	11.39	25.4	0.00	-300.0	0.00			-300.0		
Maximum	11.49	27.4	0.02	26.6		11.49			27.4	
new max	11.49	27.4	0.02	26.6			11.49			27.4
Moving Avg	11.49	27.4	0.00	-300.0	0.00	11.49	11.49	-300.0	27.4	27.4
Probe Name	COM7-UAS1000		COM6-UAS1000				AirFlow			Temperature
Time (HH:MM:SS)	Af(m/s)	Tp(degC)	Af(m/s)	Tp(degC)	Min(Af)	Max(Af)	new max(Af)	Min(Tp)	Max(Tp)	new max(Tp)
									Fri 2009-Aug-14 15:07:44	
15:08 00:00:50	11.40	25.6	0.01	26.6	0.01	11.40	11.40	25.6	26.6	26.6
15:08 00:00:51	11.40	25.6	0.01	26.6	0.01	11.40	11.40	25.6	26.6	26.6
15:08 00:00:52	11.40	25.6	0.01	23.9	0.01	11.40	11.40	23.9	25.6	25.6
15:08 00:00:53	11.41	25.7	0.01	23.9	0.01	11.41	11.41	23.9	25.7	25.7
15:08 00:00:54	11.41	25.8	0.01	24.4	0.01	11.41	11.41	24.4	25.8	25.8
15:08 00:00:55	11.42	26.0	0.01	0.9	0.01	11.42	11.42	0.9	26.0	26.0
15:08 00:00:56	11.42	26.1	0.01	0.9	0.01	11.42	11.42	0.9	26.1	26.1
15:08 00:00:57	11.44	26.5	0.01	-32.4	0.01	11.44	11.44	-32.4	26.5	26.5
15:08 00:00:58	11.47	26.9	0.01	-32.4	0.01	11.47	11.47	-32.4	26.9	26.9
15:08 00:00:59	11.47	27.0	0.00	-300.0	0.00	11.47	11.47	-300.0	27.0	27.0

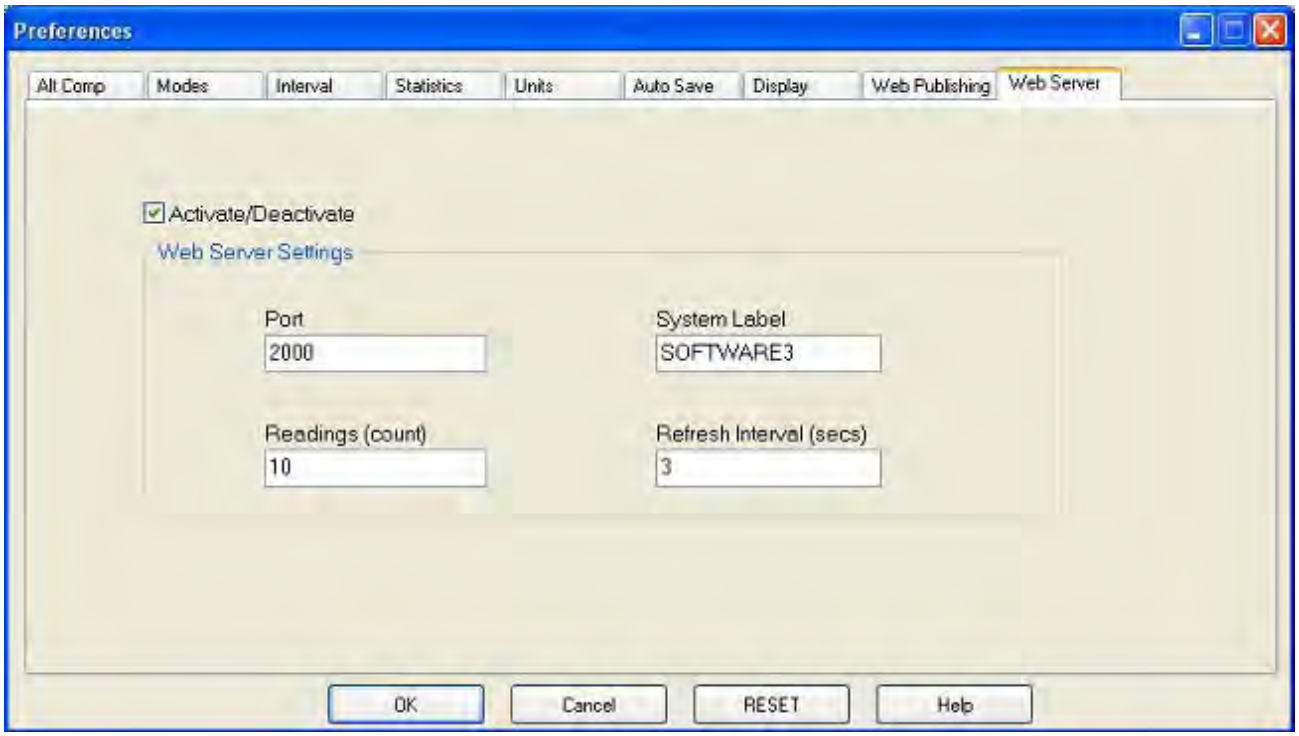
Done | Internet | Protected Mode: On | 100%

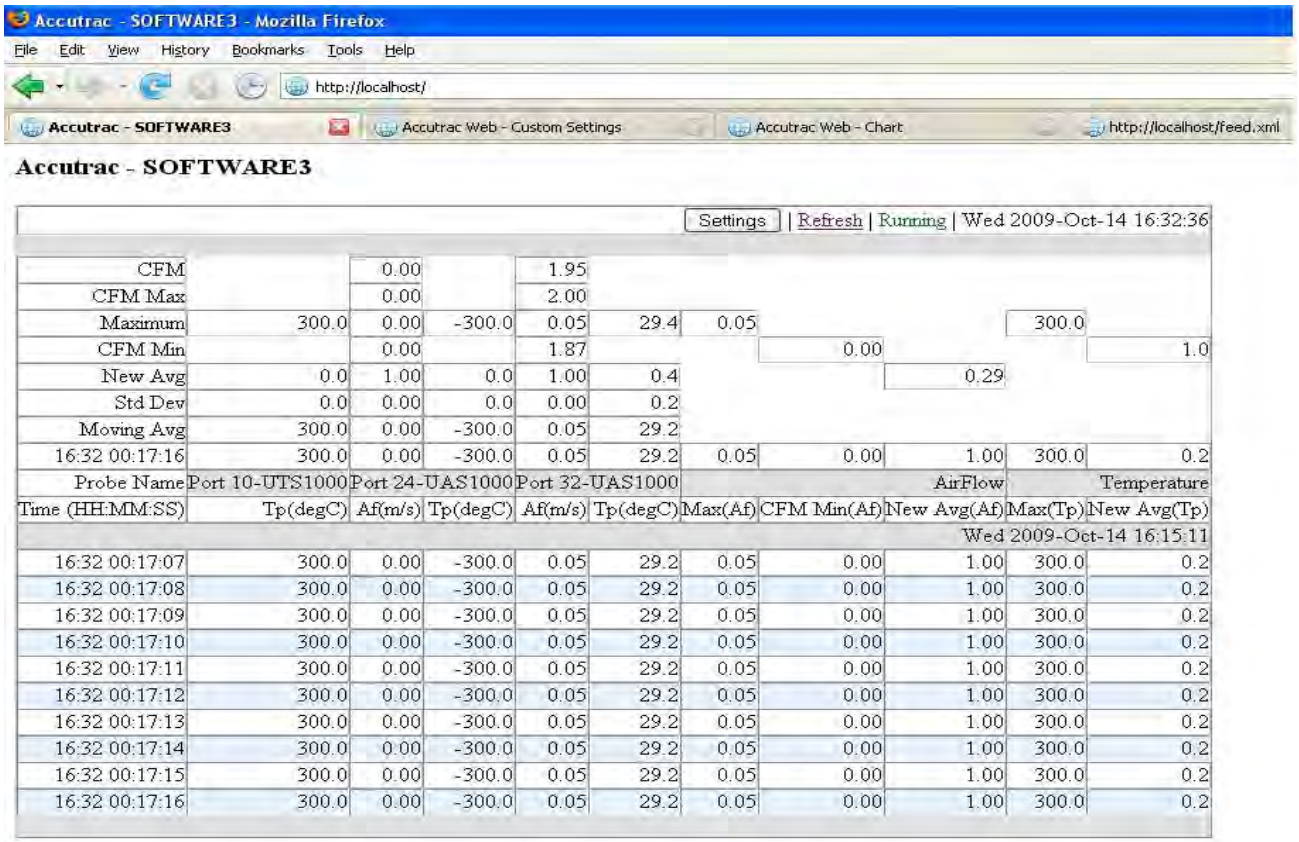
Sample web report

- **Web Server Tab**

  If web server functionality is enabled, the latest snapshot of readings, chart and feed will be available for browsing (through http) wherever the machine is available through intranet/Internet. The web server module listen for browser requests on the user-specified port and data will be returned according to the user settings.

NOTE: If web publishing or web server functionality is enabled, readings will be automatically saved to a timed Excel file in '[Windows Installed Drive(may be C:]\AccuTrac\History' folder and spreadsheet will be cleared (on the reach of each 16384 readings). But if auto-saving is specified, readings will be saved to a time-stamped file in the selected auto-save folder. These steps are to make sure that the spreadsheet will not be full and the readings process will not halt, prompting the user to save the readings.



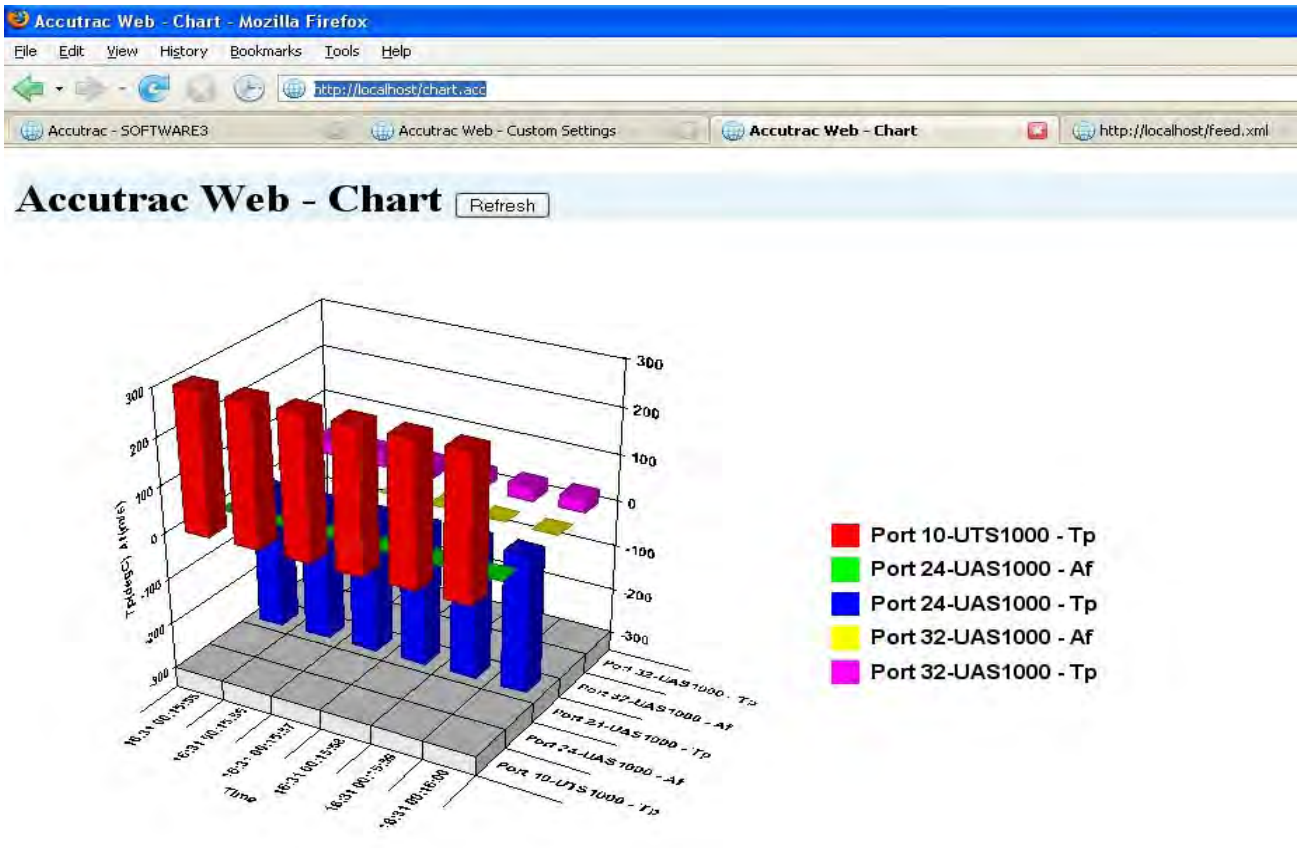

Accutrac - SOFTWARE3 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://localhost/
Accutrac - SOFTWARE3
Accutrac Web - Custom Settings
Accutrac Web - Chart
http://localhost/feed.xml
Accutrac - SOFTWARE3
Settings | Refresh | Running | Wed 2009-Oct-14 16:32:36

CFM		0.00		1.95						
CFM Max		0.00		2.00						
Maximum	300.0	0.00	-300.0	0.05	29.4	0.05			300.0	
CFM Min		0.00		1.87			0.00			1.0
New Avg	0.0	1.00	0.0	1.00	0.4			0.29		
Std Dev	0.0	0.00	0.0	0.00	0.2					
Moving Avg	300.0	0.00	-300.0	0.05	29.2					
16:32 00:17:16	300.0	0.00	-300.0	0.05	29.2	0.05	0.00	1.00	300.0	0.2
Probe Name	Port 10-UTS1000		Port 24-UAS1000		Port 32-UAS1000			AirFlow		Temperature
Time (HH:MM:SS)	Tp(degC)	Af(m/s)	Tp(degC)	Af(m/s)	Tp(degC)	Max(Af)	CFM Min(Af)	New Avg(Af)	Max(Tp)	New Avg(Tp)
								Wed 2009-Oct-14 16:15:11		
16:32 00:17:07	300.0	0.00	-300.0	0.05	29.2	0.05	0.00	1.00	300.0	0.2
16:32 00:17:08	300.0	0.00	-300.0	0.05	29.2	0.05	0.00	1.00	300.0	0.2
16:32 00:17:09	300.0	0.00	-300.0	0.05	29.2	0.05	0.00	1.00	300.0	0.2
16:32 00:17:10	300.0	0.00	-300.0	0.05	29.2	0.05	0.00	1.00	300.0	0.2
16:32 00:17:11	300.0	0.00	-300.0	0.05	29.2	0.05	0.00	1.00	300.0	0.2
16:32 00:17:12	300.0	0.00	-300.0	0.05	29.2	0.05	0.00	1.00	300.0	0.2
16:32 00:17:13	300.0	0.00	-300.0	0.05	29.2	0.05	0.00	1.00	300.0	0.2
16:32 00:17:14	300.0	0.00	-300.0	0.05	29.2	0.05	0.00	1.00	300.0	0.2
16:32 00:17:15	300.0	0.00	-300.0	0.05	29.2	0.05	0.00	1.00	300.0	0.2
16:32 00:17:16	300.0	0.00	-300.0	0.05	29.2	0.05	0.00	1.00	300.0	0.2

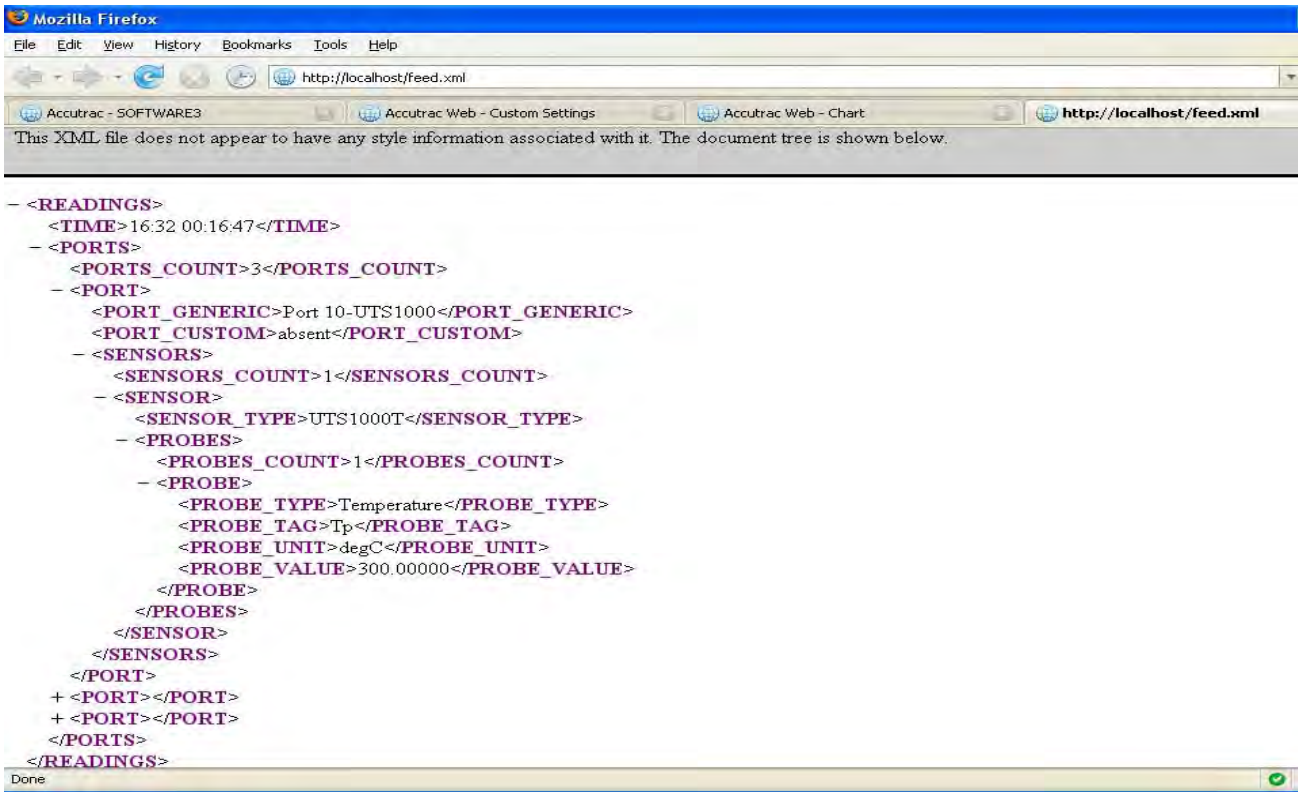
Sample main page

Accutrac Web - Custom Settings - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://localhost/custom.acc
Accutrac - SOFTWARE3
Accutrac Web - Custom Settings
Accutrac Web - Chart
http://localhost/feed.xml
Accutrac Web - Custom Settings
Readings Count 10
Refresh Interval 3
Save...
N.B: Client side settings will not be saved permanently
Go back to Home | Charting | Feed
Accutrac Web Server v1.0 (Win32), Website: www.degreeC.com

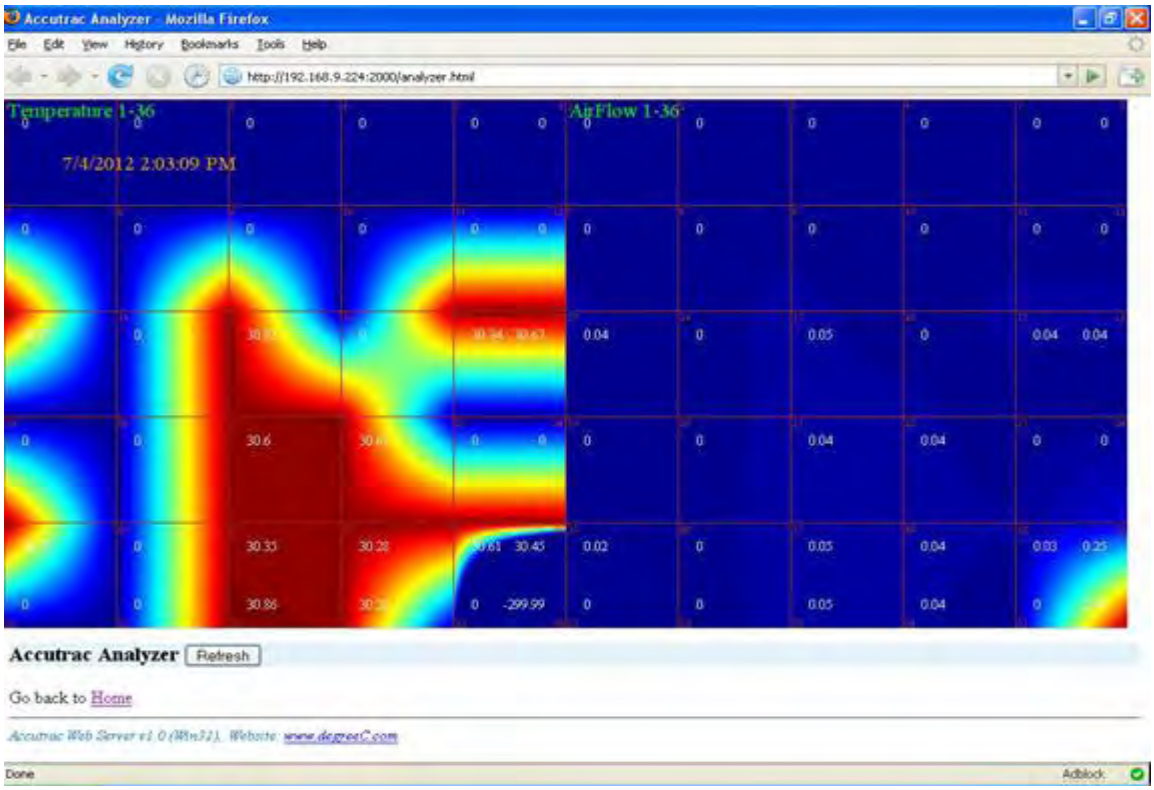
The custom page settings



The custom chart page



The sample Feed page

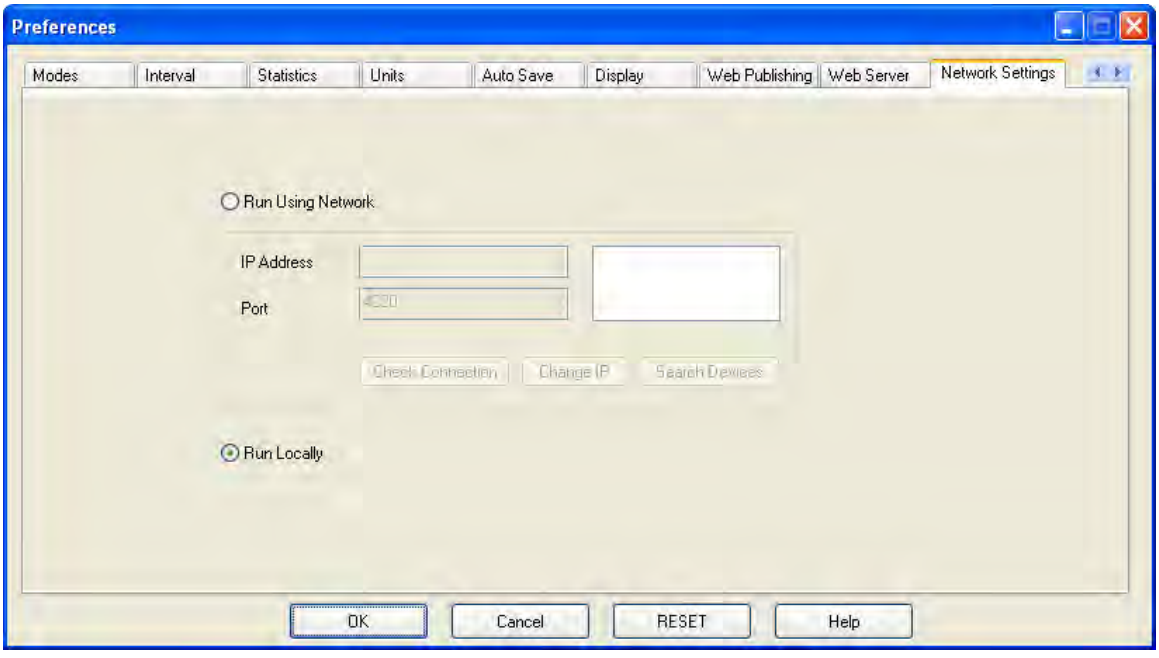


Accutrac® Analyzer - Current configuration in the host machine is getting displayed.

Accutrac Web - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://192.168.9.224:2000/
Accutrac Web Home
Analyzer | Readings | Charting | Feed | Web Settings
Accutrac Web Server v1.0 (Win32), Website: www.degreeC.com

Home Page

- **Network Settings Tab**



Details about the network settings option is explained at the end of the document (Page Number 84).

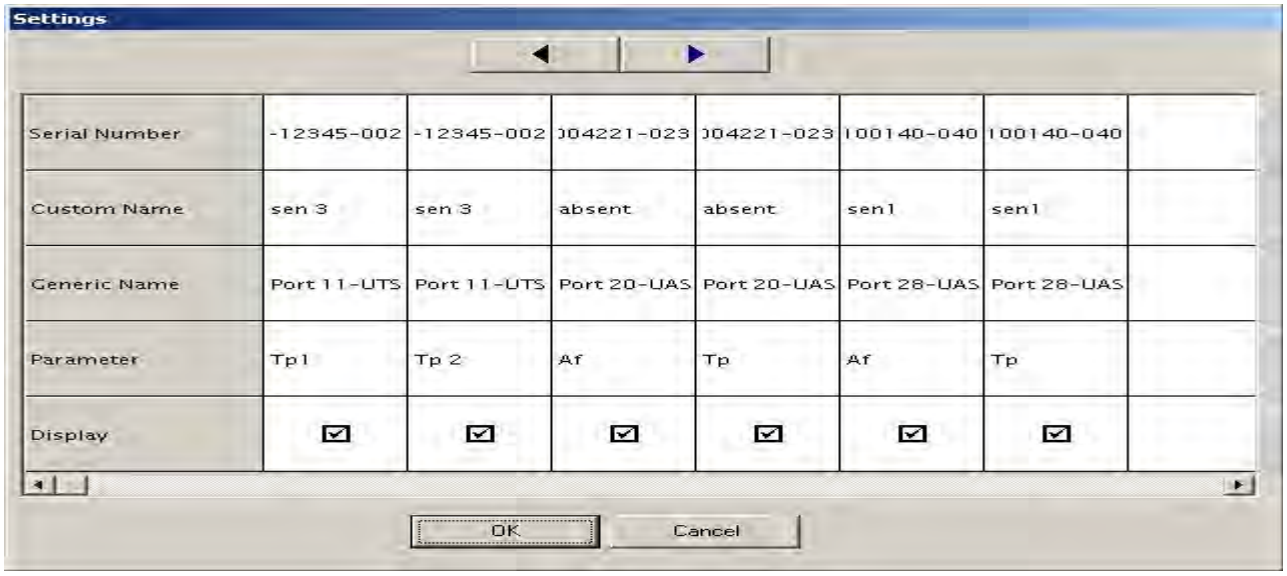
- **Settings Tab**

  The settings screen allows you to view the following data related to connected sensors:

  Serial Number
  Custom probe name
  Parameter
  Display

NOTE: To change the order of display of the sensors in the spreadsheet you can move the sensors by clicking on the row and clicking the arrows for left or right.

NOTE: The Display checkbox (last row) and Arrow Buttons can be used for displaying/hiding the columns and for sorting the display, but has effect only upto when either of AccuTrac software or ATM2400 hub is restarted. In other words, it is a dynamic feature for detail level **custom sorting**, for the currently available (connected) sensors. For a permanent sorted display of sensors, use one of **port number based sorting** or **serial number lookup based sorting** described in Display Tab of Preferences Screen. Custom sorting can be applied over an initially sorted sensor list (sorted through port number or serial based sorting).

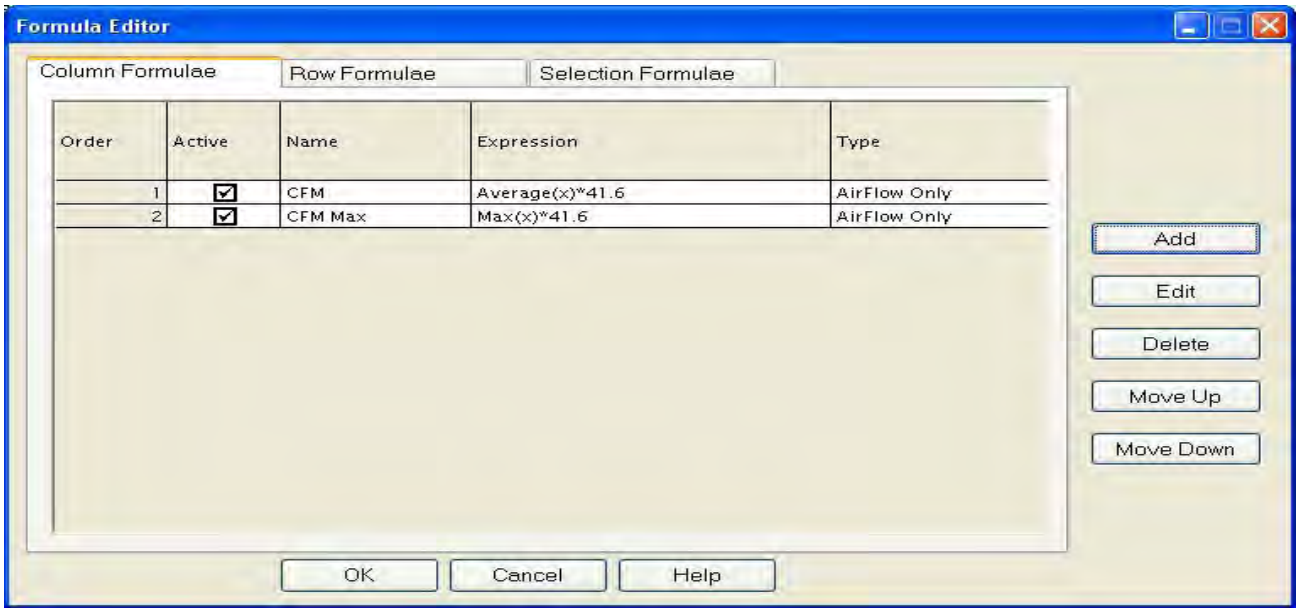


- **Formula Editor**

  Using Formula Editor, you can define and save formulae that can work on rows, columns or on a random selection of readings in the datasheet.

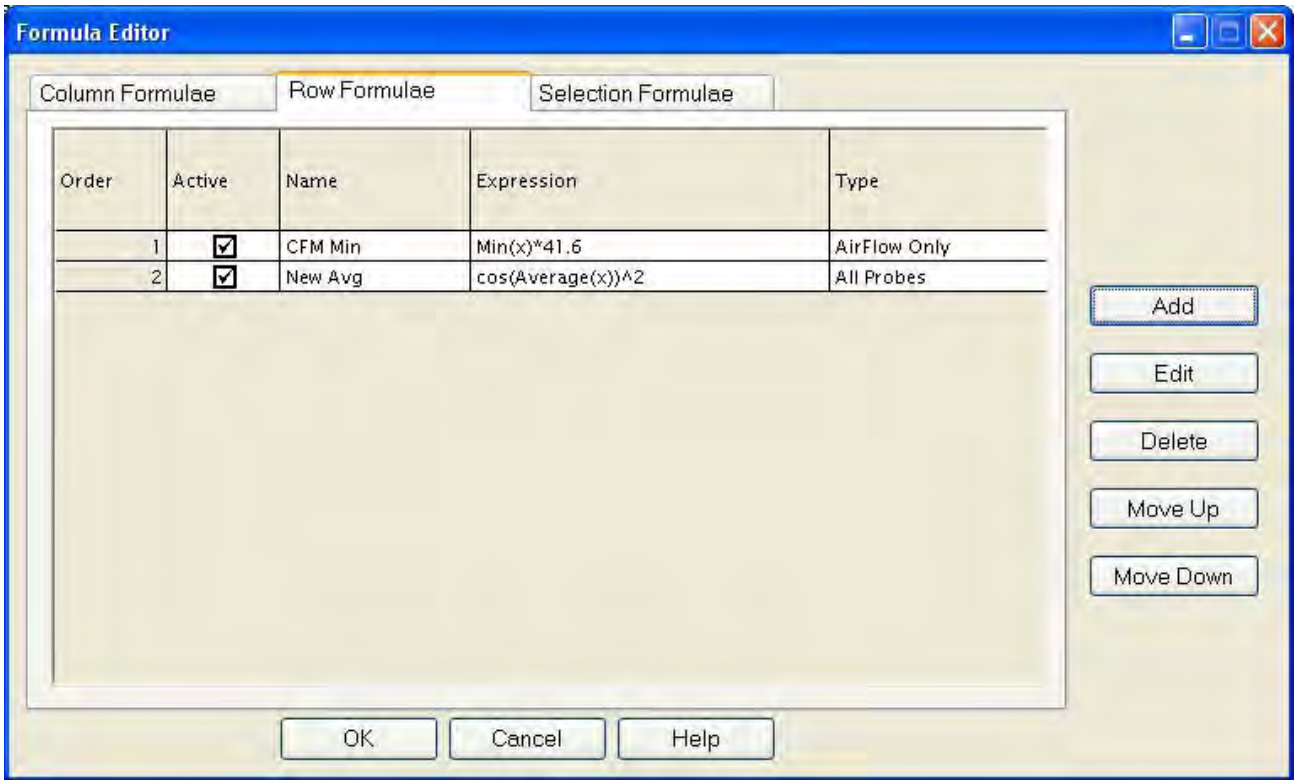
  Column Formulae

  You can define formulae that have to work on each column of spreadsheet readings, in the Column Formulae tab of the Formula Editor. The formulae will be displayed on the top of each column.



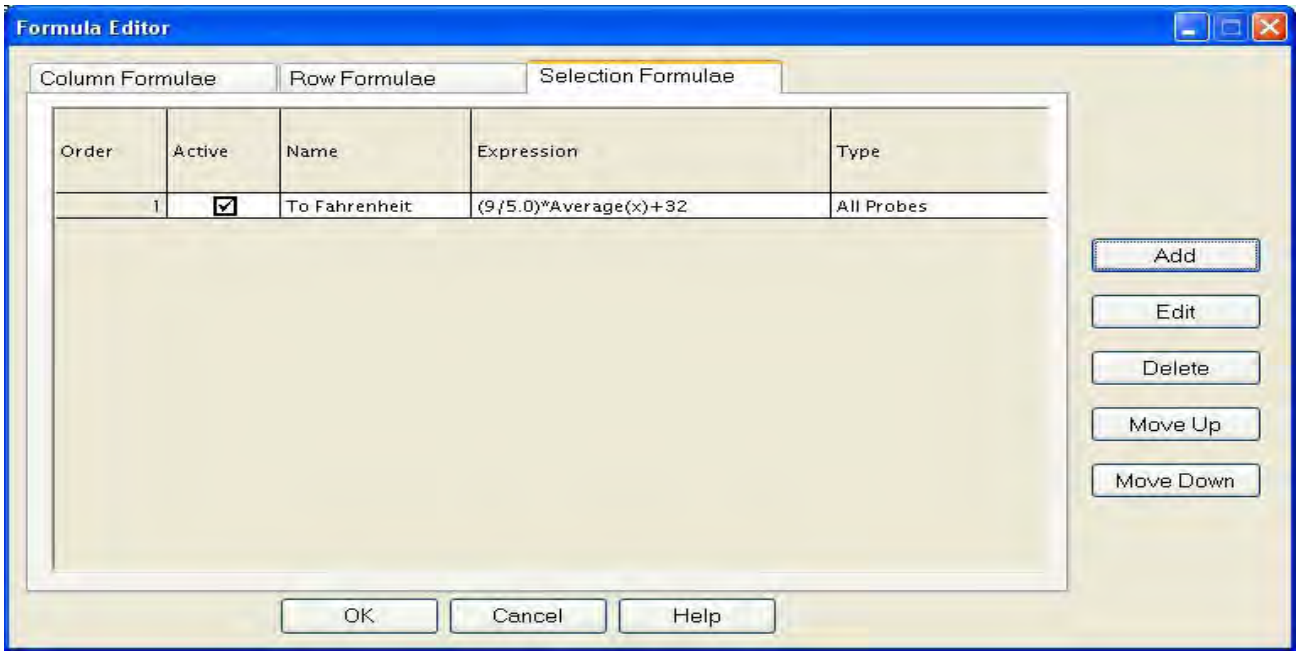
Row Formulae

You can define formulae that have to work on each row of spreadsheet readings, in the Row Formulae tab of the Formula Editor. The formulae will be displayed on the right side of readings grouped for each sensor type, and also on the top of each column.



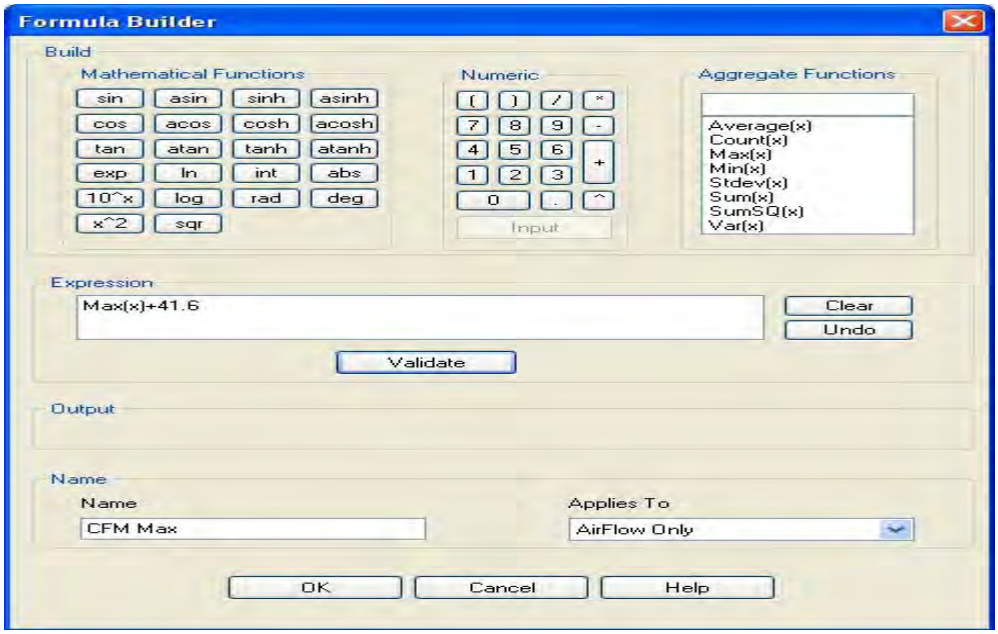
Selection Formulae

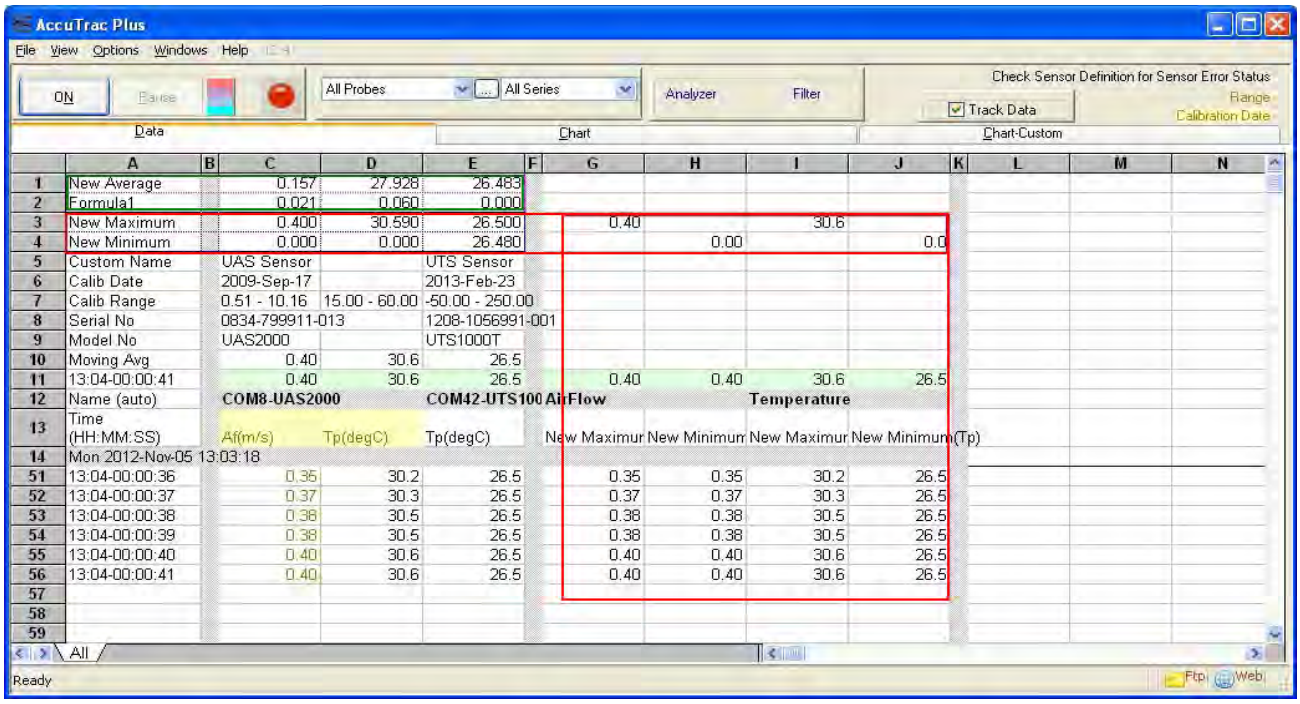
You can define formulae that have to work on a random selection of spreadsheet readings, in the Selection Formulae tab of the Formula Editor. The formulae will be displayed in Data Context Menu and result will be on the right-side of the data tab.



- **Formula Builder**

Formula Builder helps to generate a custom formula expression for the Column Formulae, Row Formulae or Selection Formulae.

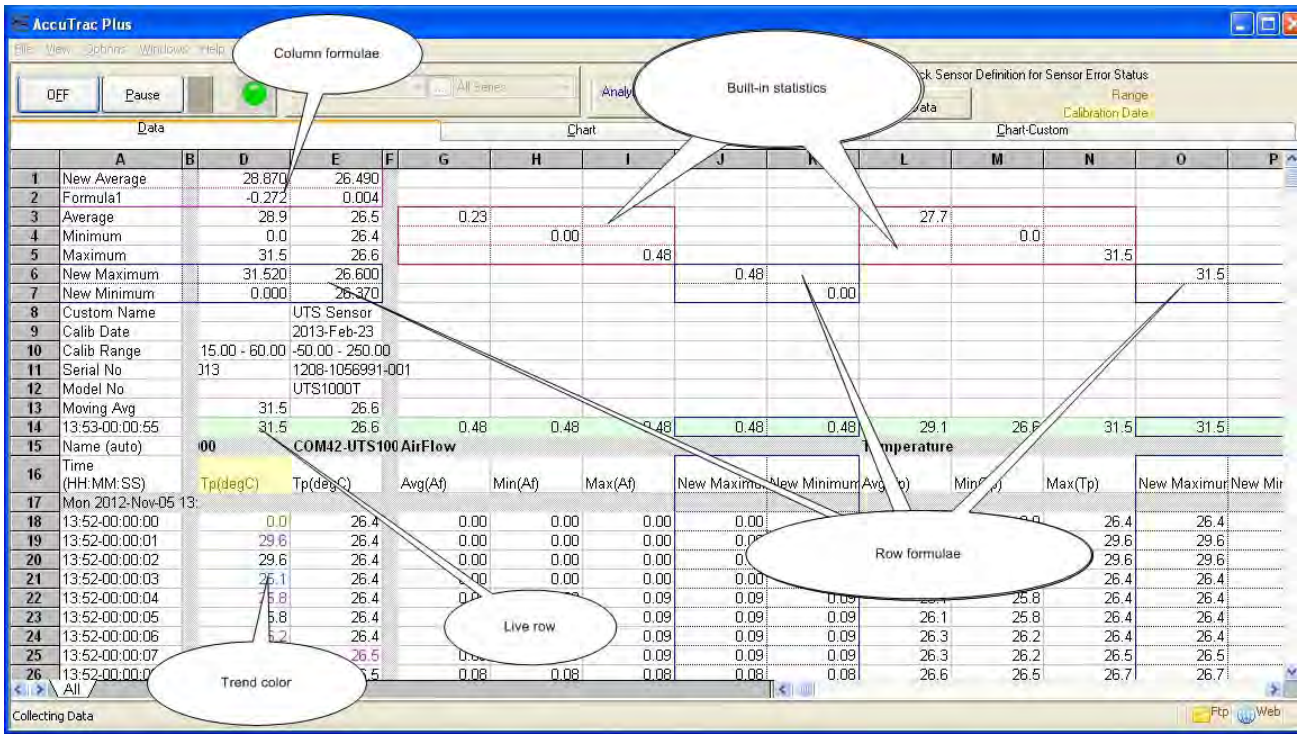



AccuTrac Plus
File View Options Windows Help
ON
All Probes
All Series
Analyzer
Filter
Check Sensor Definition for Sensor Error Status
Track Data
Range
Calibration Date
Data
Chart
Chart-Custom
New Average 0.157 27.928 26.483
Formula1 0.021 0.060 0.000
New Maximum 0.400 30.590 26.500
New Minimum 0.000 0.000 26.480
Custom Name UAS Sensor UTS Sensor
Calib Date 2009-Sep-17 2013-Feb-23
Calib Range 0.51 - 10.16 15.00 - 60.00 -50.00 - 250.00
Serial No 0834-799911-013 1208-1056991-001
Model No UAS2000 UTS1000T
Moving Avg 0.40 30.6 26.5
13:04-00:00:41 0.40 30.6 26.5 0.40 0.40 30.6 26.5
Name (auto) COM8-UAS2000 COM42-UTS100 AirFlow Temperature
Time (HH:MM:SS) Af(m/s) Tp(degC) Tp(degC) New Maximur New Minimum New Maximur New Minimum(Tp)
Mon 2012-Nov-05 13:03:18
13:04-00:00:36 0.35 30.2 26.5 0.35 0.35 30.2 26.5
13:04-00:00:37 0.37 30.3 26.5 0.37 0.37 30.3 26.5
13:04-00:00:38 0.38 30.5 26.5 0.38 0.38 30.5 26.5
13:04-00:00:39 0.38 30.5 26.5 0.38 0.38 30.5 26.5
13:04-00:00:40 0.40 30.6 26.5 0.40 0.40 30.6 26.5
13:04-00:00:41 0.40 30.6 26.5 0.40 0.40 30.6 26.5
All
Ready
Ftp
Web

Formulae In Action

29.1				
	-519150.7			
		0.5		
29.1	-12479.6	0.9		
Temperature				
Max(Tp)	CFM Min(Tp)	New Avg(Tp)		
28.6	-12479.6	0.7	(01) To Fahrenheit =	58.16885024
28.6	-12479.6	0.7		
28.7	-12479.6	0.7		
28.7	-12479.6	0.7		
28.8	-12479.6	0.7		
28.8	-12479.6	0.8		
28.8	-12479.6	0.8		
28.8	-12479.6	0.8		
28.9	-12479.6	0.8		

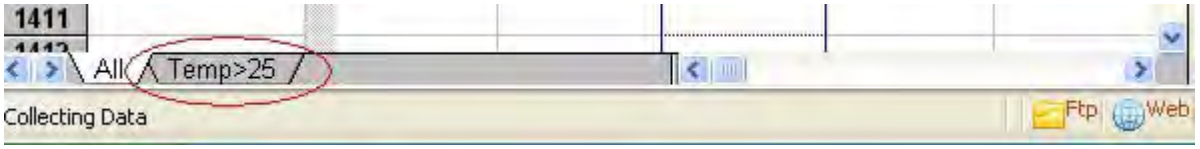
Selection Formulae In Action



Border coloring for built-in and custom formulae

- **Filter Definition**

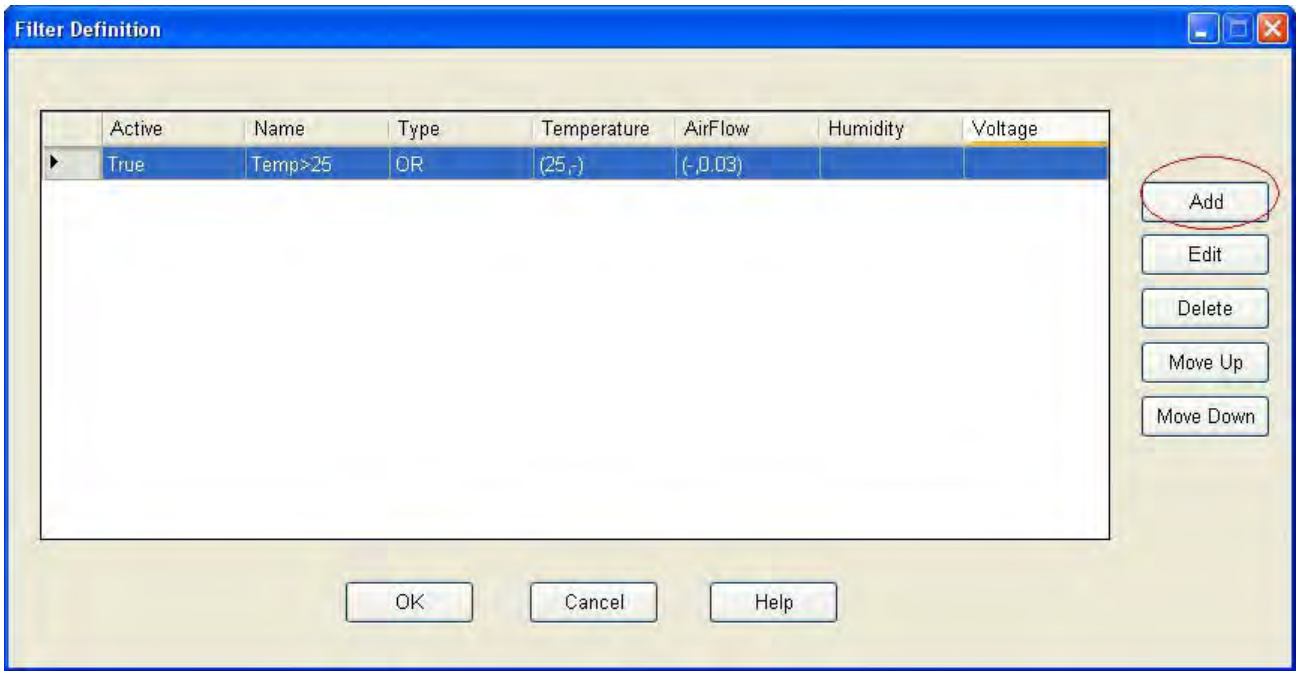
Filters can be used to define as many extra sheets of data, that display only the rows that meet the specified condition regarding the range of values; and regarding the probe.



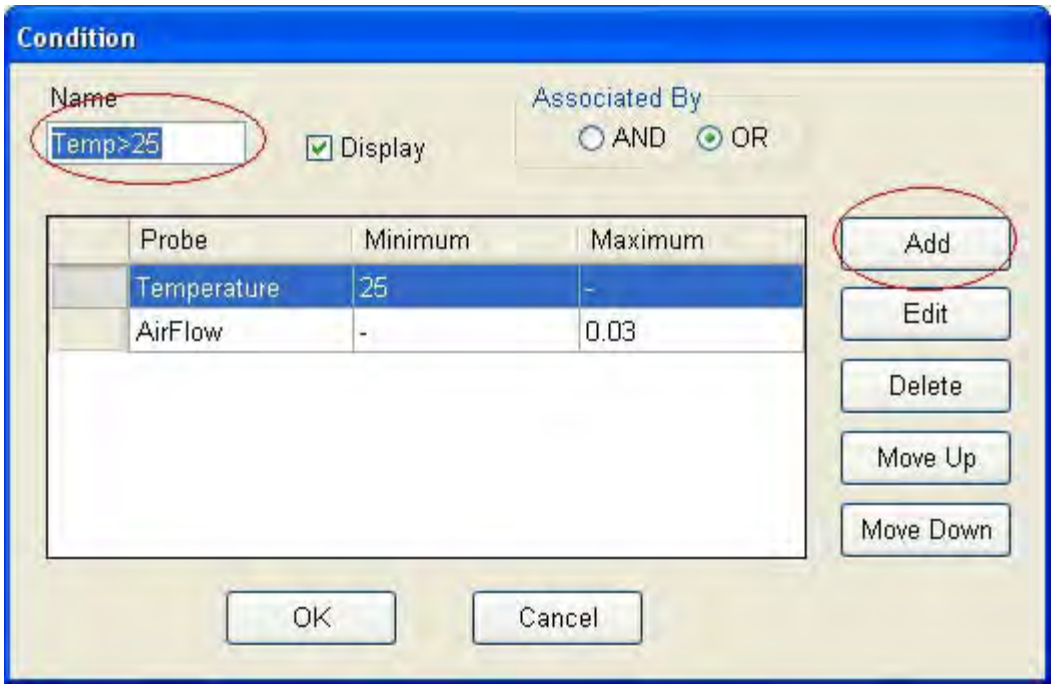
Filter in Action

To define new filters, click on the 'Filter' link in Accutrac®, when the data collection is stopped.

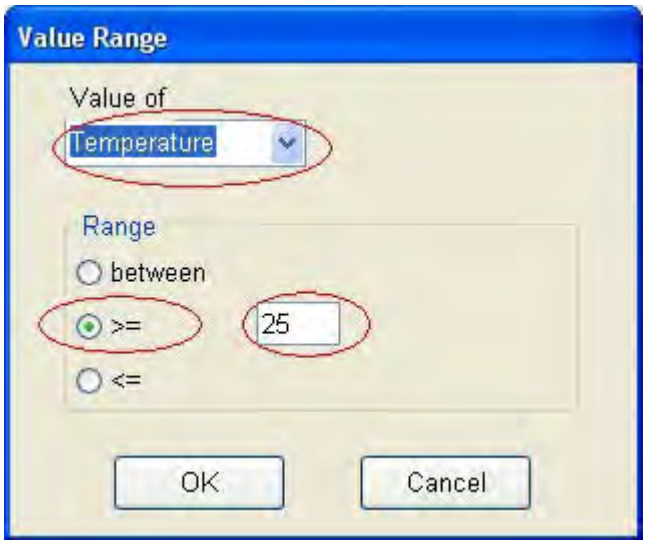
Add/Edit Filters



Filter Definition



Filter Condition



Filter Range

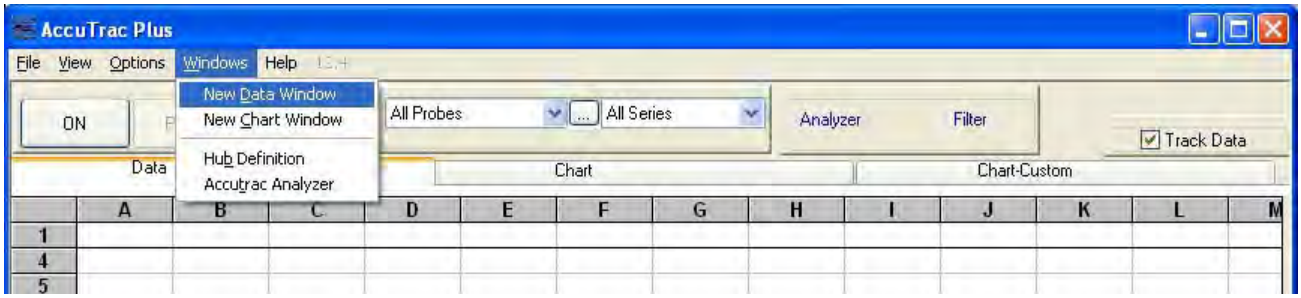
.

NOTE: Compound conditions: There is no facility to define filters with compound conditions. Normally it is better (simple and useful) to define multiple filters.

NOTE: A by-product of data filtering is that user can get multiple screens of the same data. This is useful when there is more than a screen of columns to be displayed. You can define a dummy filter (means a filter that has an always true condition, eg:Temprature<=567), to show all the rows in another sheet. Then you can scroll to different part of the sheet in each of the sheets, and switch between sheets to see all the readings in a quick way.

8.14 Windows Menu

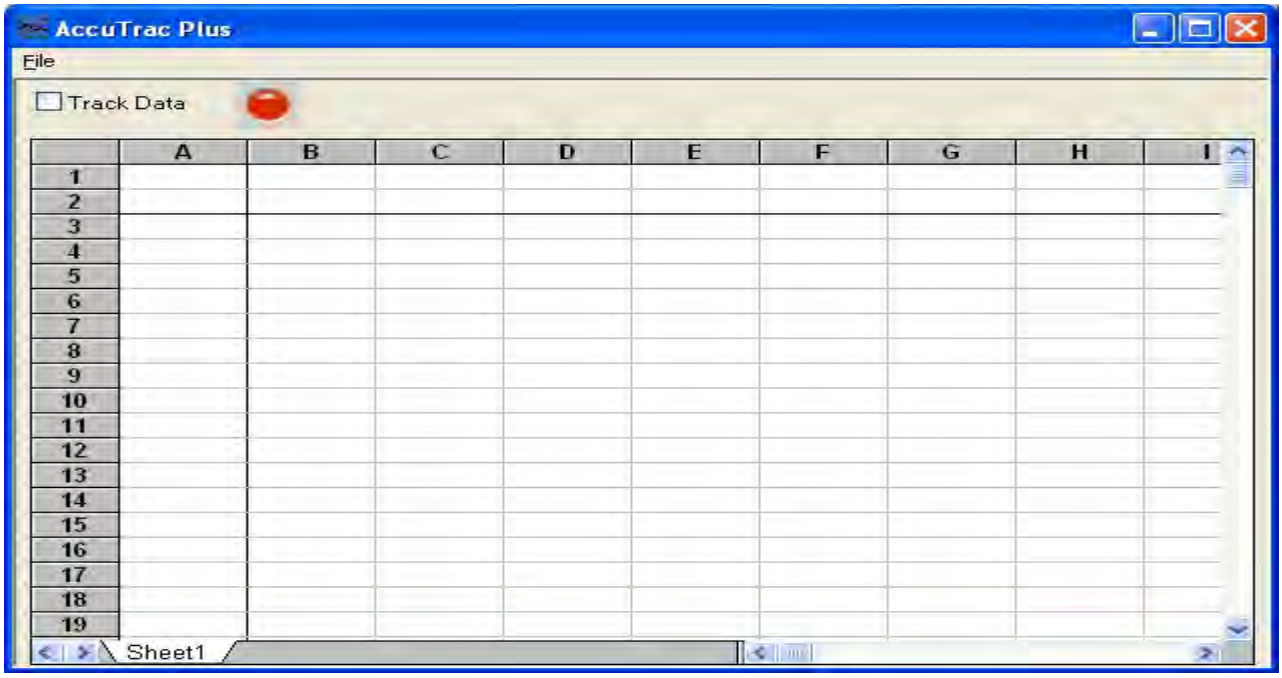
New Data Window and New Chart Window can be used to open and analyze pre-saved readings (*.xls) and chart (*.vtc) files. If any of these windows are kept open before you 'ON' data collection, you will get the data in main window copied to these new windows, to work with a subset of whole (prospective) data.



Windows Menu

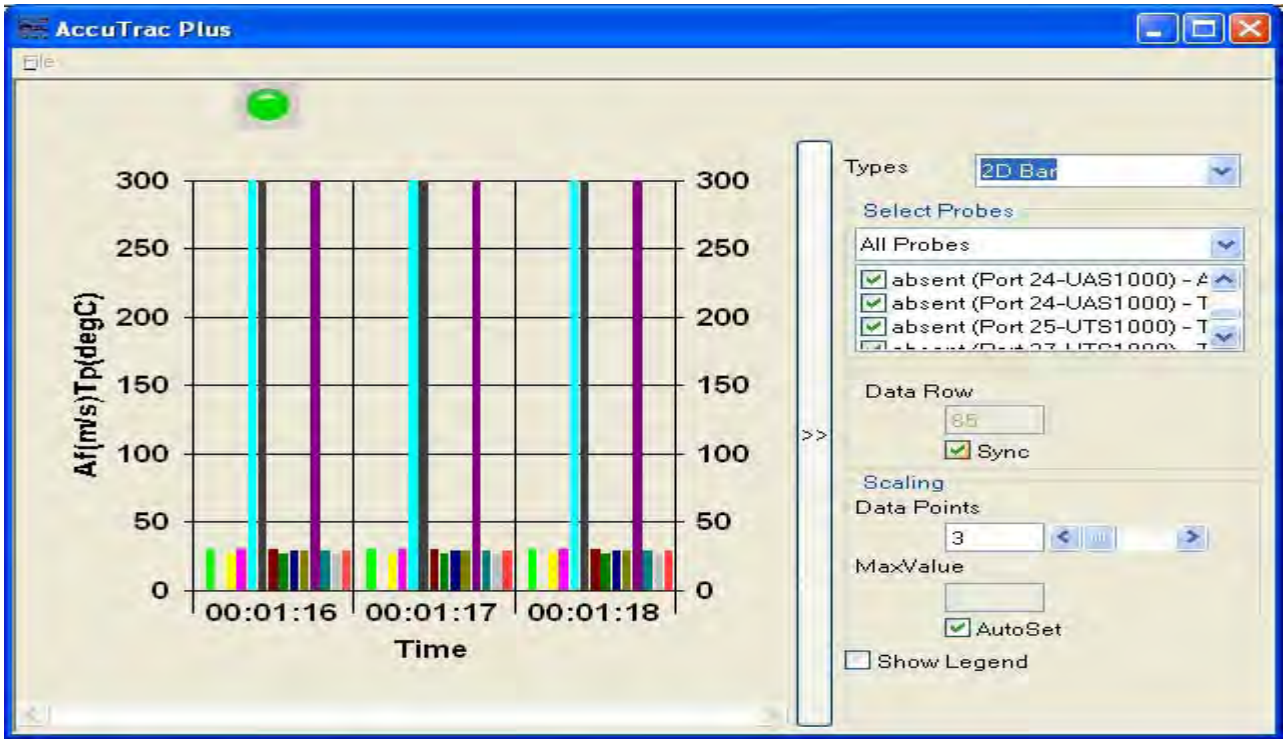
- **New Data Window**

  Opens a new data collection session on your desktop.



- **New Chart Window**

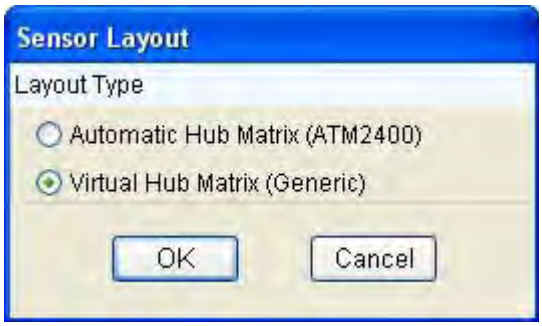
  Opens a new chart session on your desktop.



New Chart Window

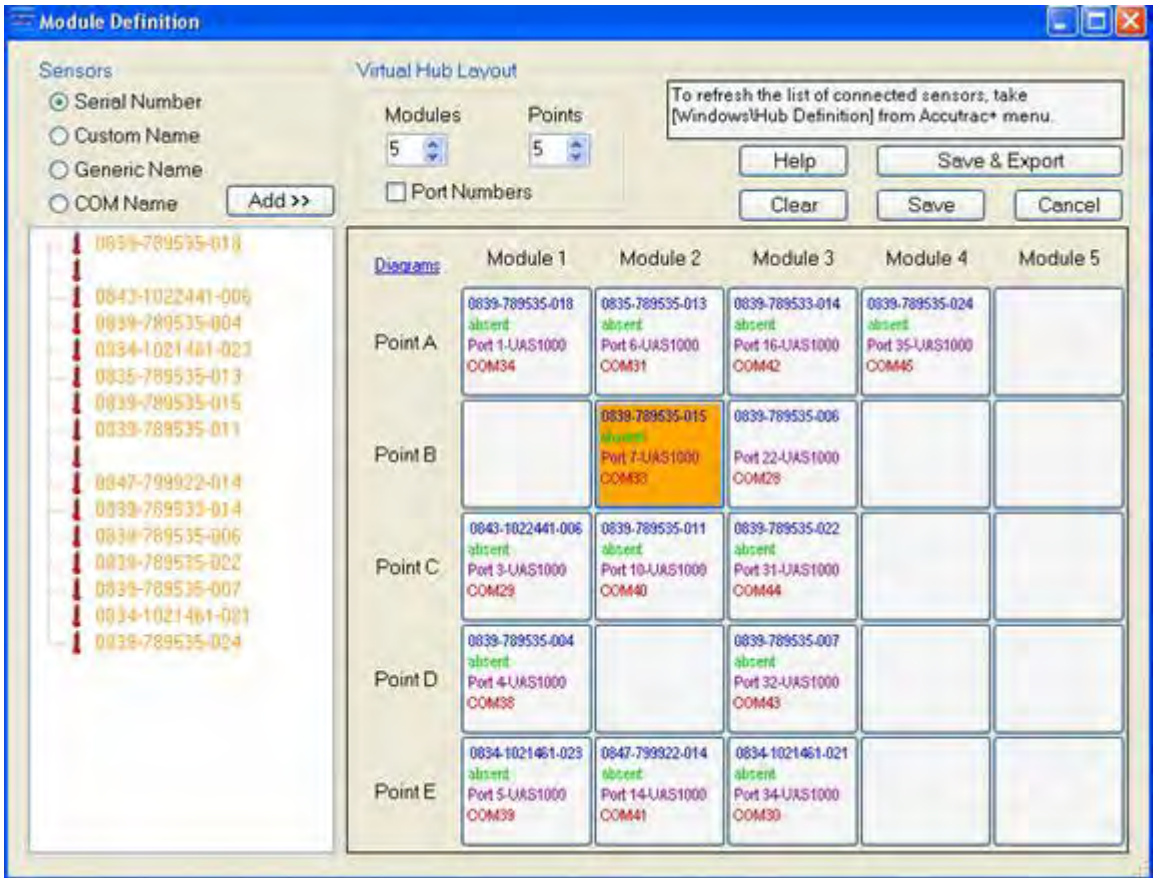
- **Hub Definition**

  Virtual hub is used to layout sensors to be displayed in the analyser. Userscan define virtual modules out of non-ATM 2400 hubs (call as generic hubs) , where seqential port numbers are not defined programmatically . Sensors connected in ATM 2400 can also be put in virtual hub, if you need a custom layout.



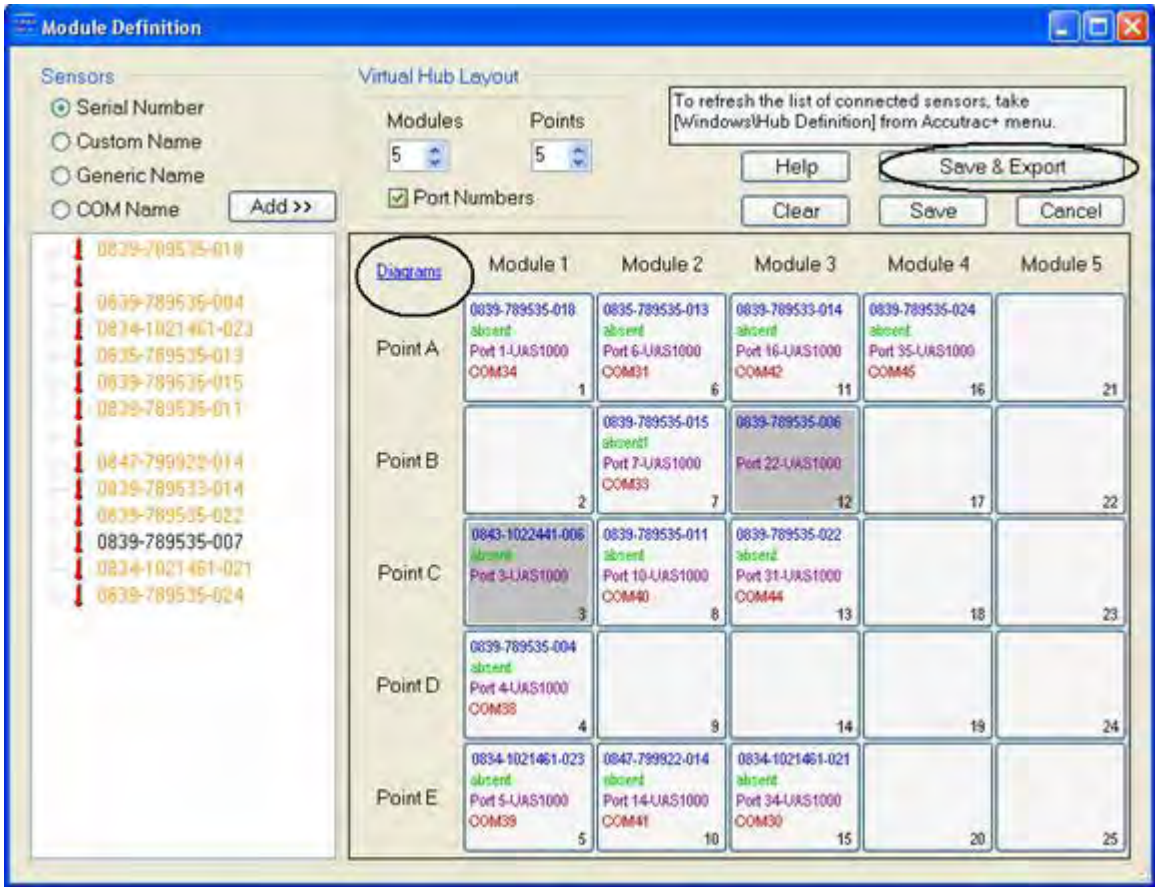
- „Automatic' is default, which means that modules are defined by consecutive ports in the hub; the first n ports in ATM2400 hub define module 1, next n ports define module 2 and so on.

- If you select „Virtual' , you can define the virtual hub in the following screen. Now first n ports in the virtual hub define module 1, next n ports define module 2 and so on.



- Only the connected (and power on) sensors are listed in the left-list. So do remember to power onthe sensors, before taking [Hub Definition] from accutrac menu.

- You can drag and drop sensors from the left-list to appropriate locations in the virtual hub. Sensorsdragged are shown in orange in left-list, and that are in black are the ones yet to be assigned to the grid.
- Once placed, you can drag sensors to rearrange to another location in the hub.
- Click and hold on a serial number, to highlight (find) that item in the hub.
- You can opt to display custom-name, generic-name or COM number instead of serial number (for the convenience of identification), still the internal mapping being against serial number.
- Click on „Add>>' button to add all sensors sequentially to the grid. Once added you can rearrange by dragging in between.
- Tick „Port Numbers' to display sequential port numbers.
- You can click and press delete key to delete an existing sensor from hub (or right-click and select „Delete').
- User can select number of modules, and number of points in the module. But that can be dynamically changed in analyzer, anyway.
- „Save' once you are finished.



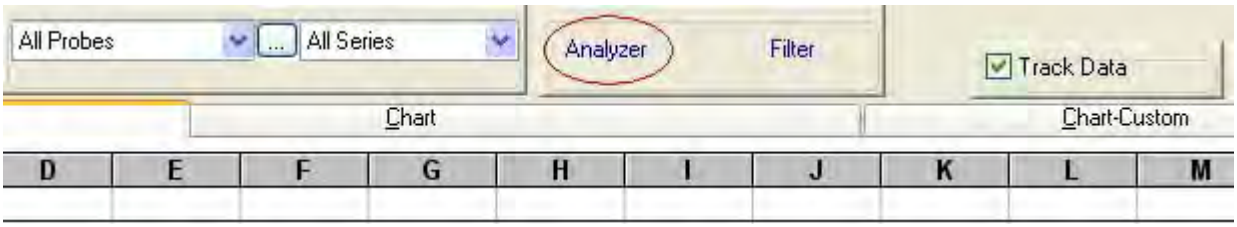
- The left tree displays only the currently connected items.
- To get the latest list of sensors connected, power on and then take [Hub Definition] from accutrac menu.
- The grayed items in the grid are earlier saved ones, but currently not connected (not available). You can delete or keep those items.
- The black items in left-list are ones that are yet to be assigned in hub (newly connected sensors).

- **Accutrac Analyzer**

Analyzer is used to analyze the behaviour of live data, and to understand the meaning of readings on a contionus layout. Analyzer will be updated automatically on data collection. You will have a separate tab for each type of probes that is currently connected (airflow, temperature etc.).
You can open up analyzer anytime (independent of whether data colletion is on or off), by clicking the analyzer link on top of the accutrac screen (see figure below) or by selecting Accutrac® Analyzer from Windows menu.
You can select a particular matrix layout (rows, columns and pages) of sensors from the top of the screen. The layout of sensors can be automatic or virtual. Automatic means it depends on port numbers on ATM2400 hub. In virtual layout, sensors can be programatically placed on a grid of sensors. No random layout is supported at the moment.

Switching between Windows:

To activate or to switch to the analyzer, click on the 'Analyzer' link anytime in Accutrac®.

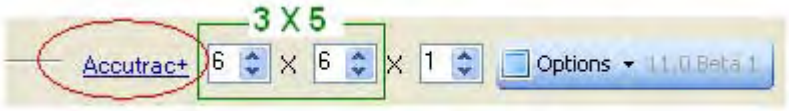


To switch back to accutrac, click on the 'Accutrac+' link anytime in Analyzer.

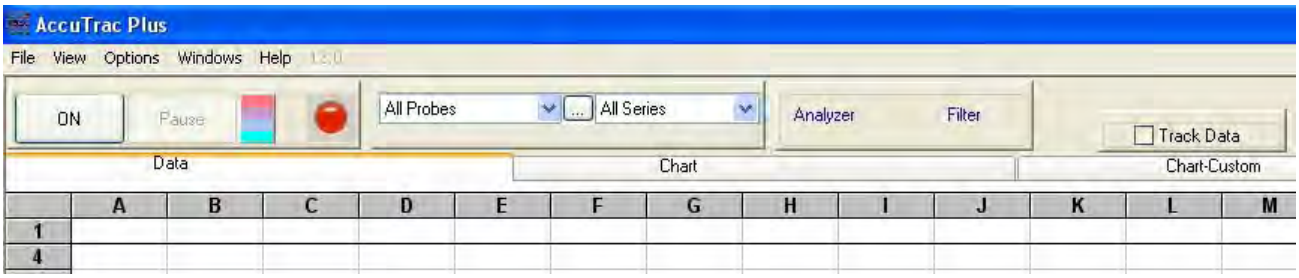
Usage Instructions (**Example**):

Step 1: Place and fix the sensors in a physical grid of size of your choice (eg: 5 X 3) and connect sensors accordingly to ATM2400 hub (port numbers 1 to 15).

Step 2: Start accutrac, click on analyzer link to open it up. Change matrix size to 5X3 or 3X5 as you want, as in the screenshot below.



Step 3: Start data collection by pressing 'ON' button in main accutrac window.



Step 4: Select Gradient tab, there a continuous mapping of live readings is available.

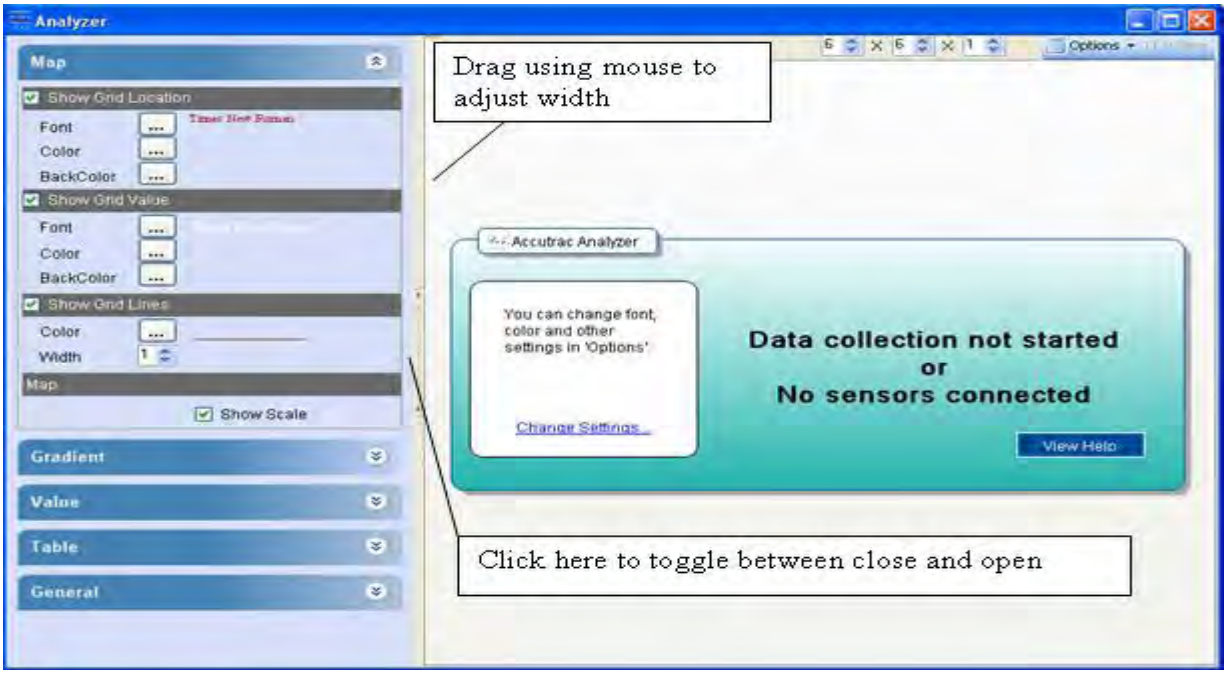
NOTE 1: If you have a set of 30 sensors, and placed them in two 3X5 grids for example, select 2 in pages drop-down, and connect sensors at ports 1 to 30 in the hub.

NOTE 2: If you are using a generic hub (non-ATM2400), power-on sensors and select Hub Definition from Windows menu to define the matrix.

Analyzer Tabs:

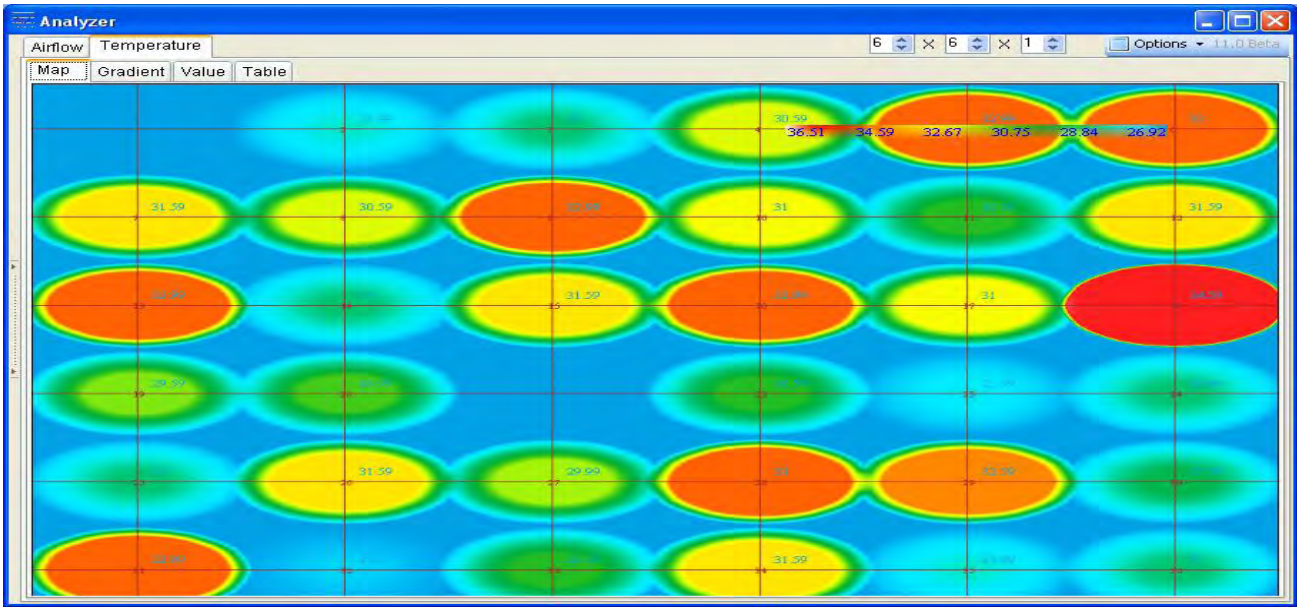
Analyzer has the following facilities.

Map - Tree map of sensor values
Gradient - Continuous gradient of the sensor-grid layout
Value - 3D magnitude display of sensor grid values
Table - Tablular display and subgroup statistics, averaging over a period of time

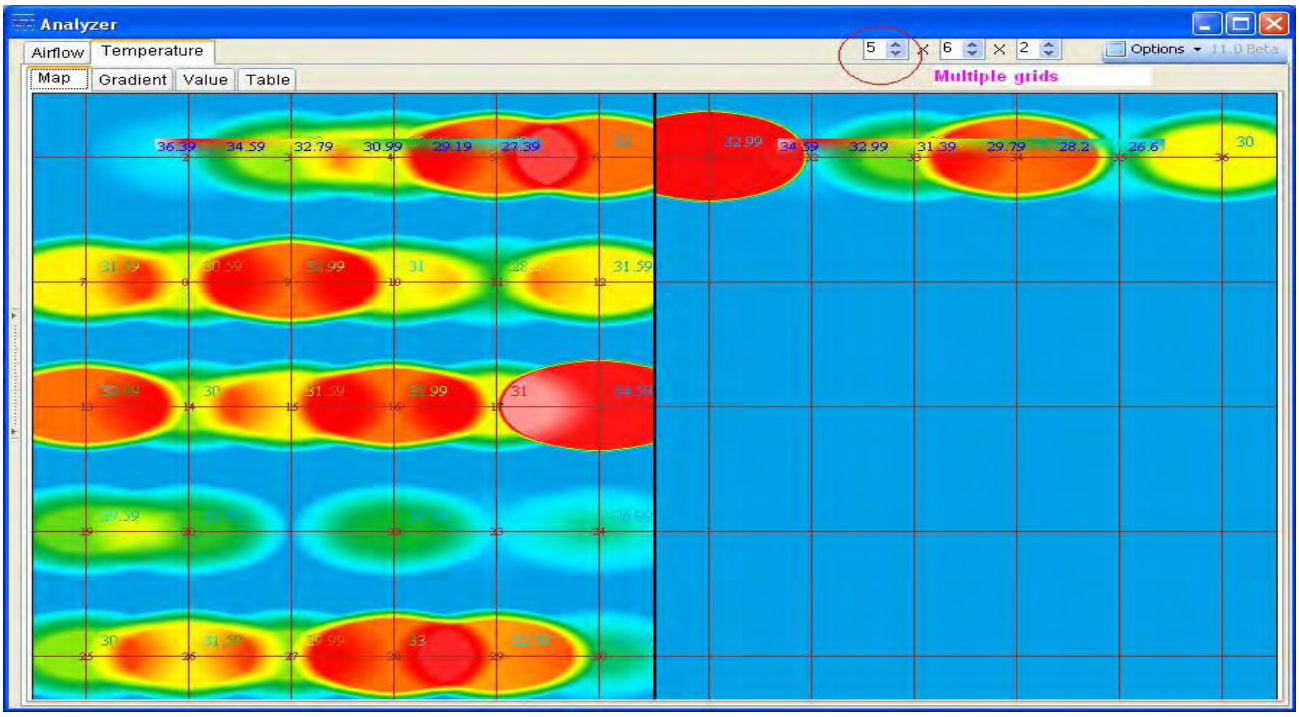


Map

Map tab displays a tree map of sensor values. Map can be used to distinguish the variation at different points in the layout. The scale on the right-top displays the total range of readings.



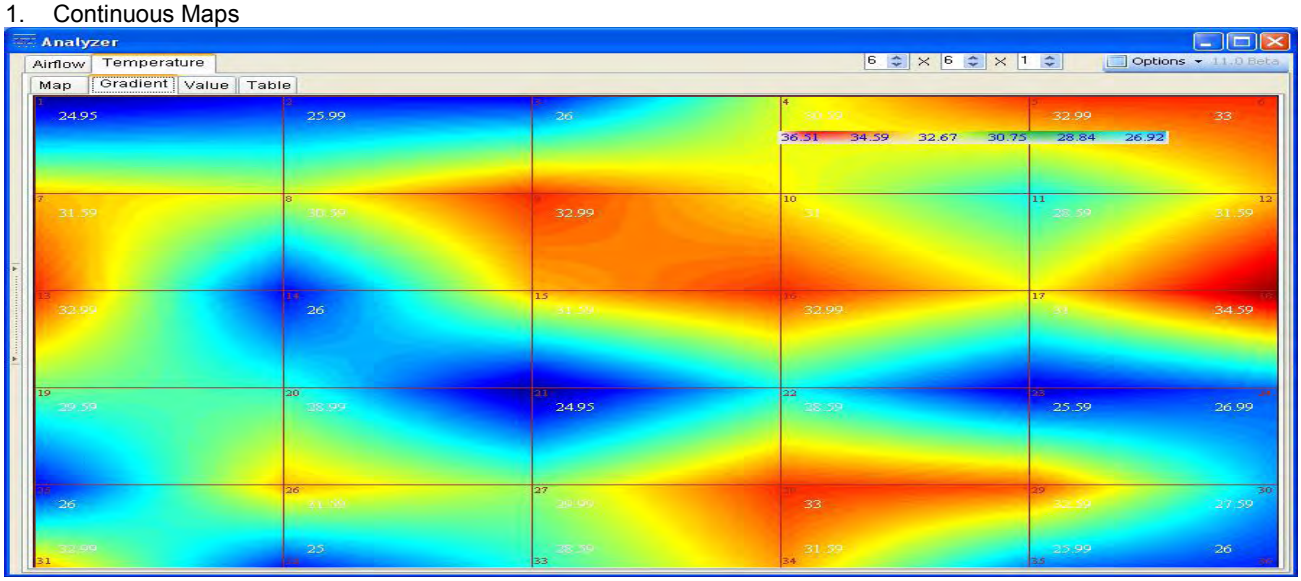
You can change the number of rows and columns in the layout. Also can select number of pages (layout planes) of that type.



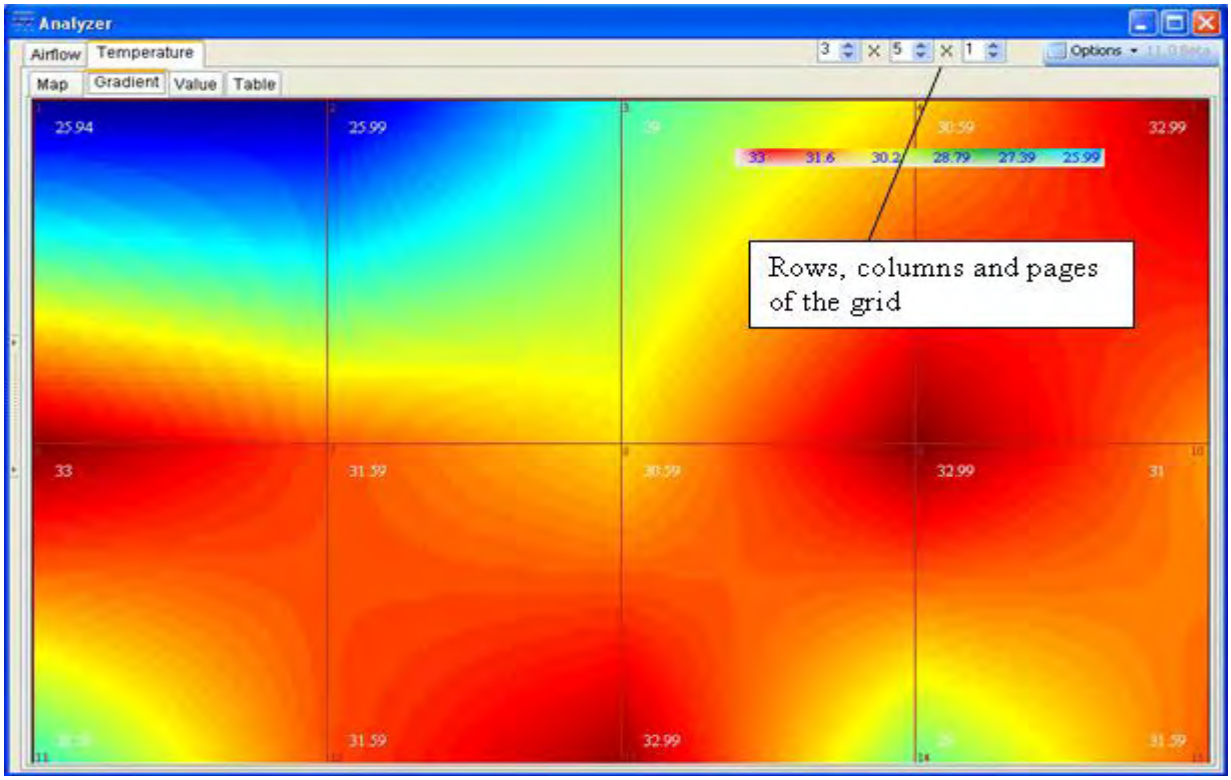
Gradient

Gradient tab displays continuous gradient of the sensor-grid layout; and so is useful to understand the general behavior of the layout.

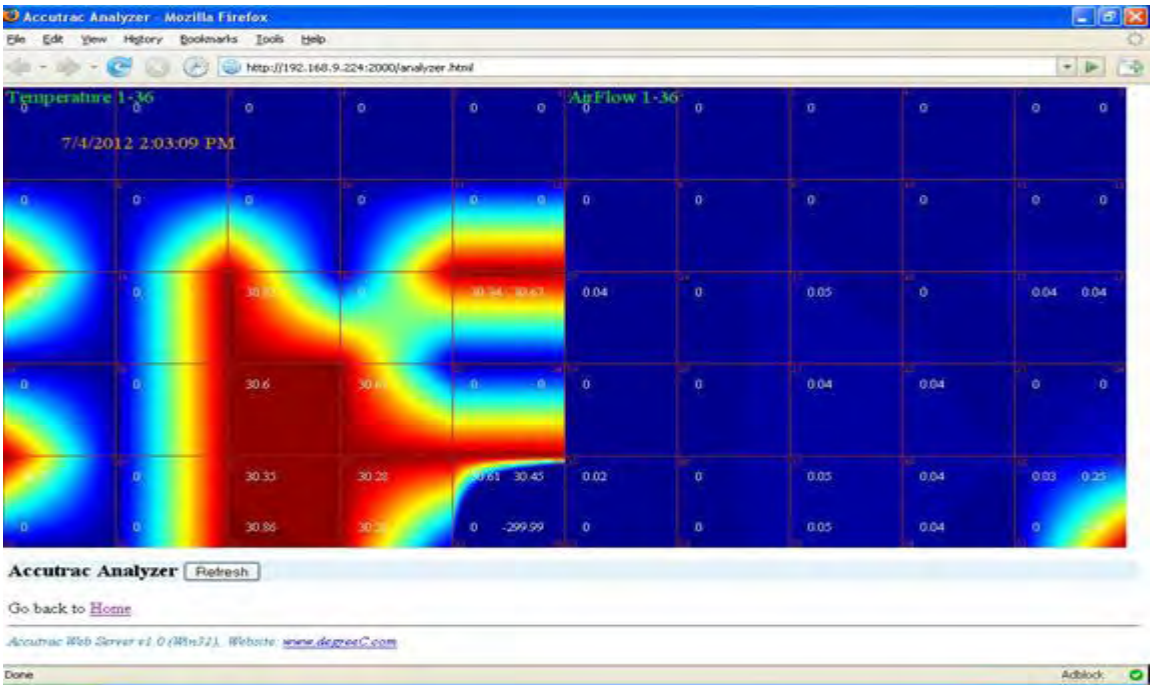
1. Continuous Maps



The following is that for a 3X5 layout plane.



A time-stamped live gradient (basic) is available over web from another machine in the intranet (or Internet, if a public IP address is assigned). The probes (Airflow, Temperature etc) are combined in a single page. Please refer Web Server functionality to learn more.



2. Discrete Maps

To get a non-continuous map, according to custom number of ranges of values, do the following:

1) Display Options by selecting the Options button on top of the screen (see figure below).

2) Select Map Type as Discrete.

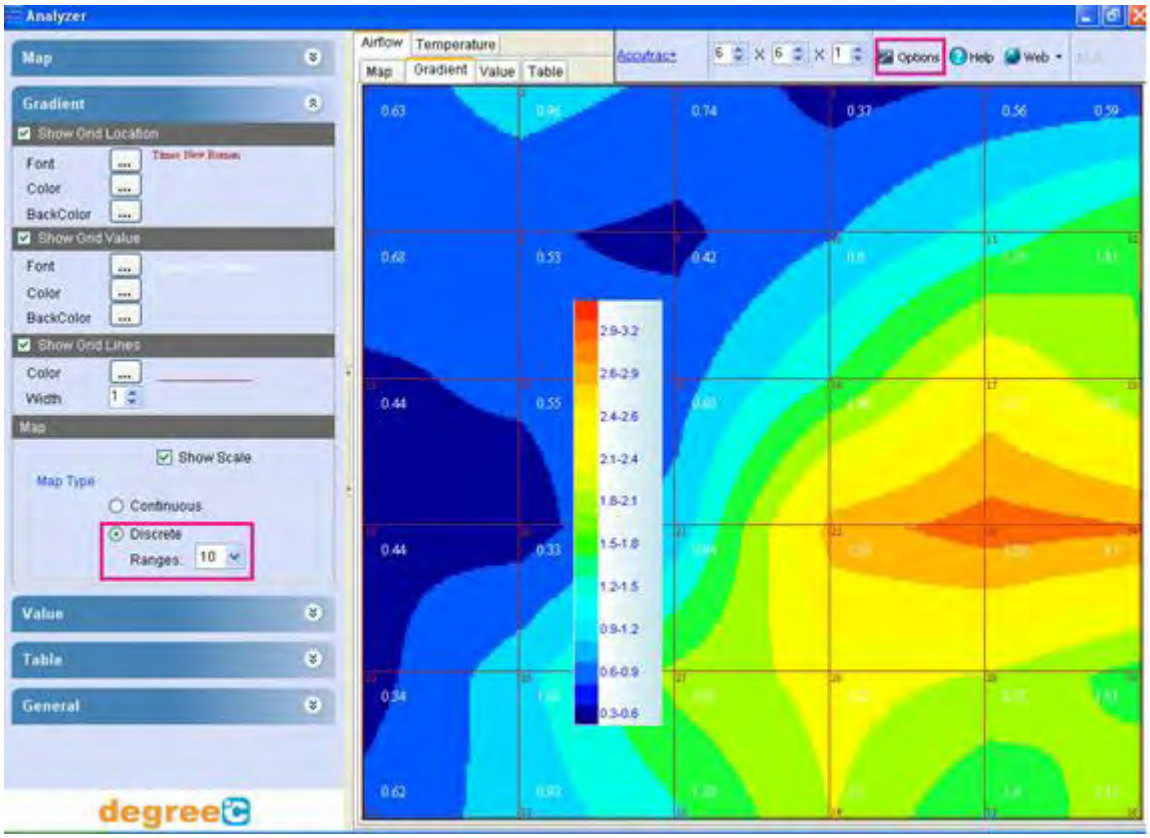
3) Select the number of Ranges.

Example:

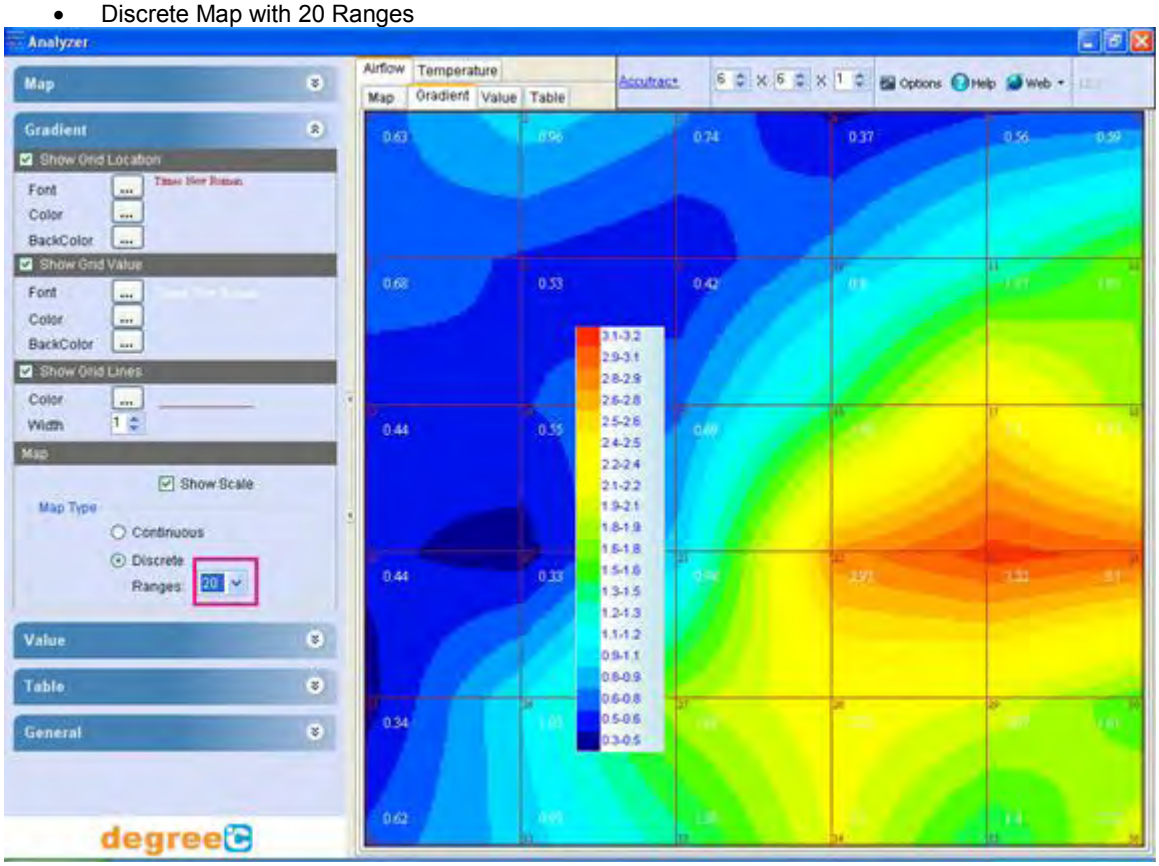
- Data

  The charts are corresponding to the following airflow data:
  X1 X2 X3 X4 X5 X6
  Z1 0.630484 0.962839 0.739839 0.371194 0.555355 0.585871
  Z2 0.676806 0.532032 0.417097 0.798516 1.274065 1.805452
  Z3 0.438258 0.55229 0.686806 1.48871 2.504452 1.732032
  Z4 0.443194 0.332516 0.939097 2.924161 3.220161 3.09629
  Z5 0.344903 1.034097 1.883387 2.223161 2.068839 1.607032
  Z6 0.621032 0.927452 1.376903 2.104548 1.401258 2.119581

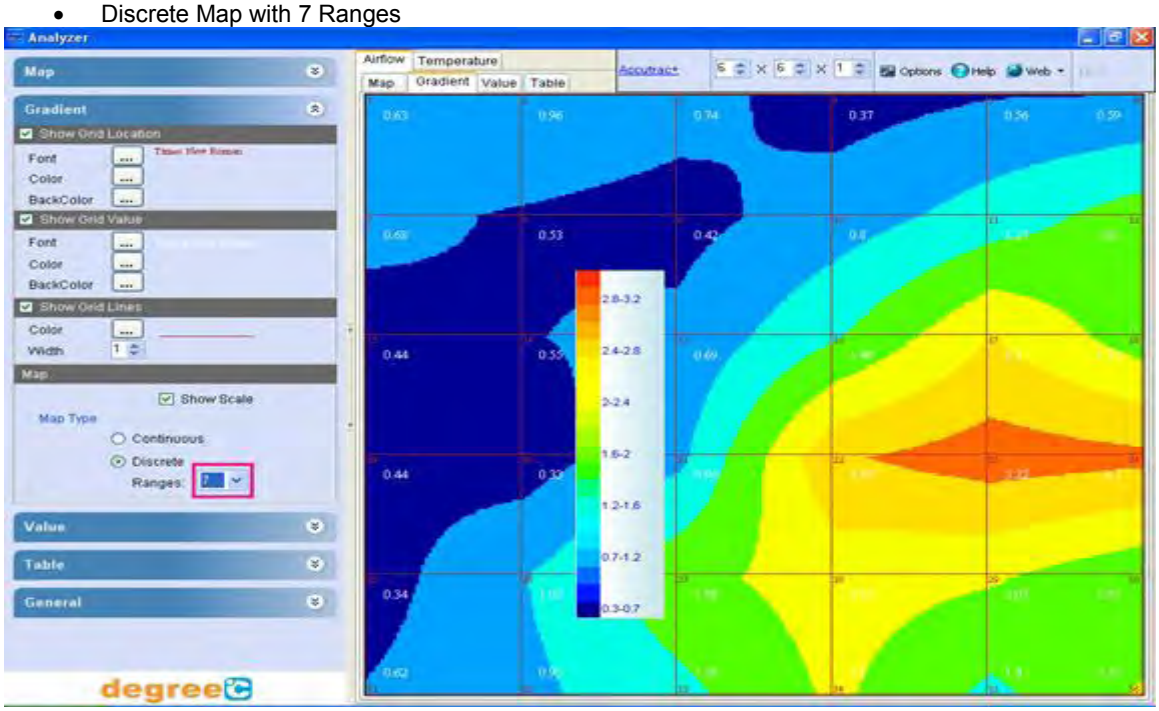
- Discrete Map with 10 Ranges



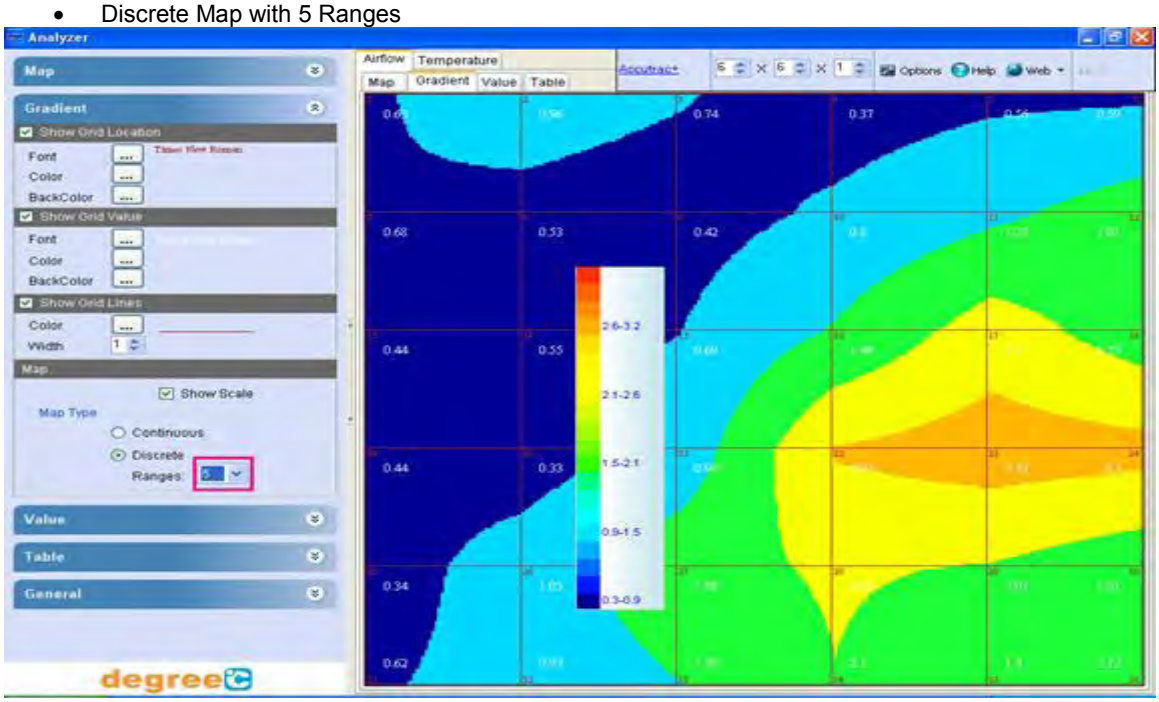
- Discrete Map with 20 Ranges



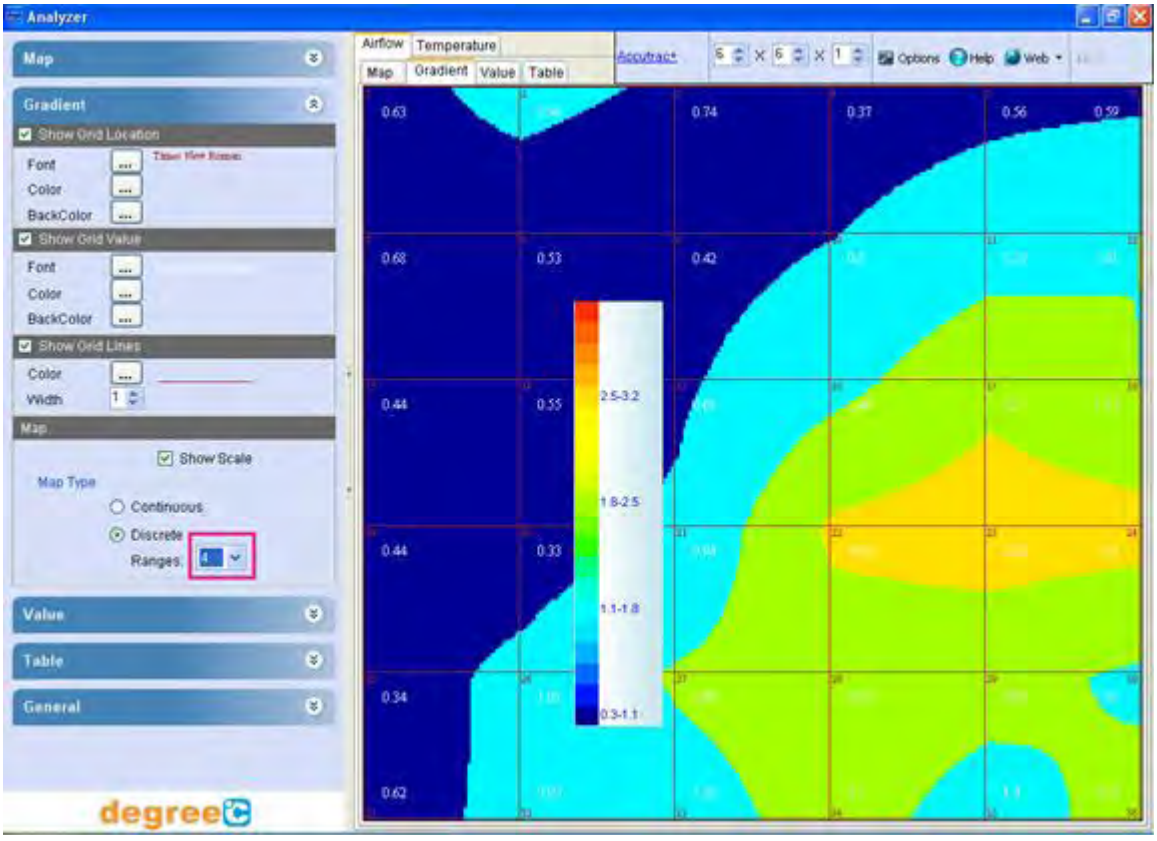
- Discrete Map with 7 Ranges



- Discrete Map with 5 Ranges

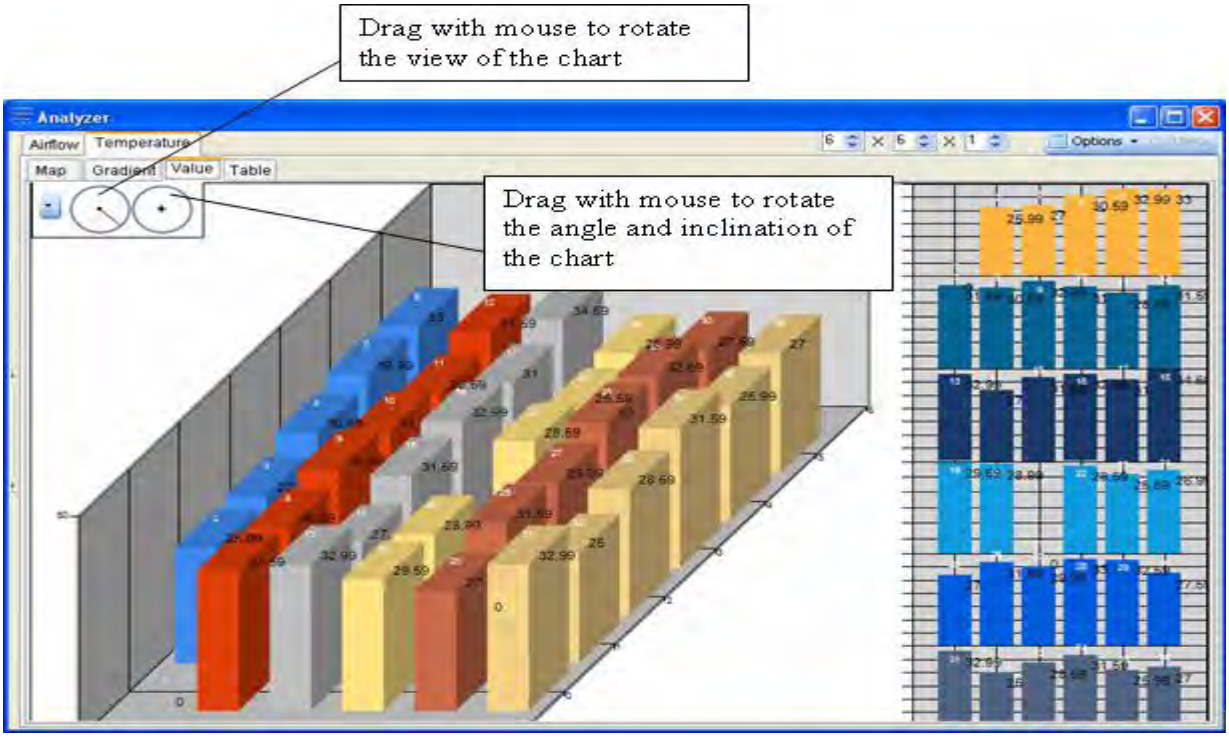


- Discrete Map with 4 Ranges

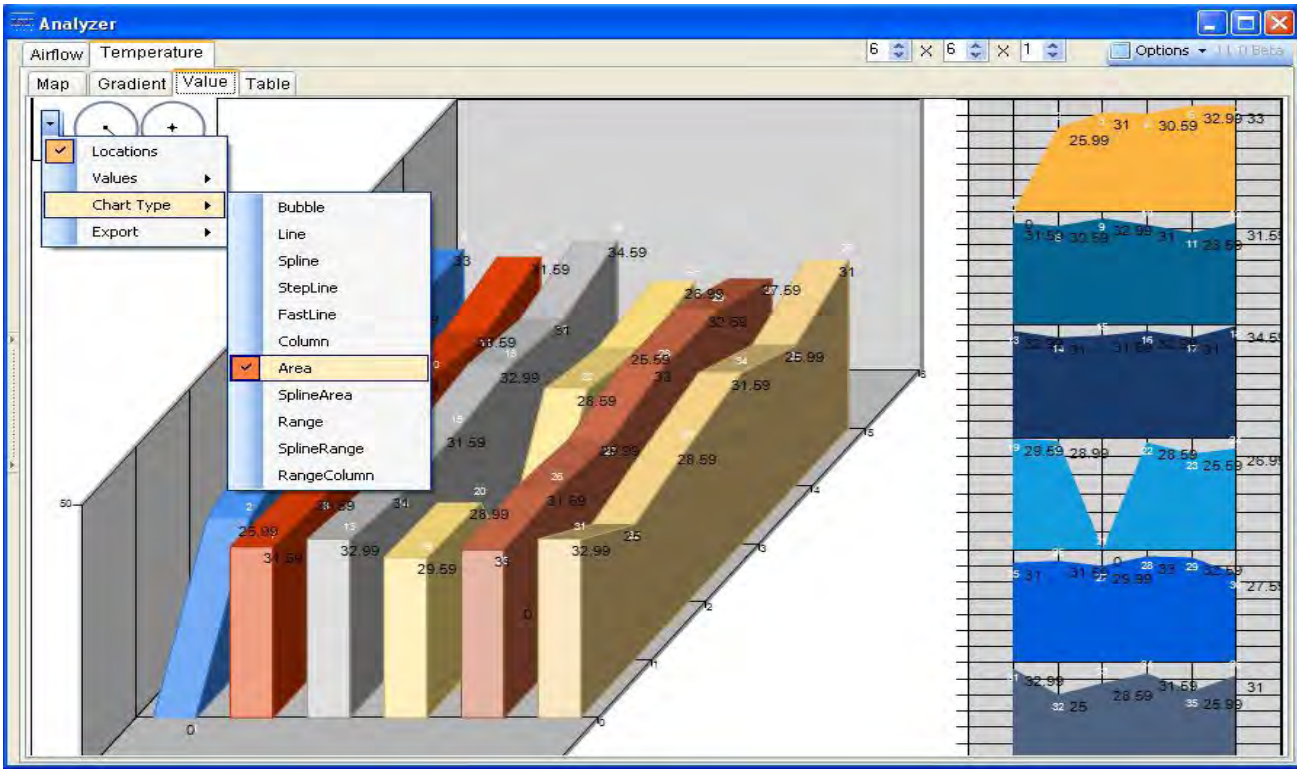


Value

Value tab displays 3D magnitude display of sensor grid values. The live-chart of the layout is useful to understand the fluctuation in values.

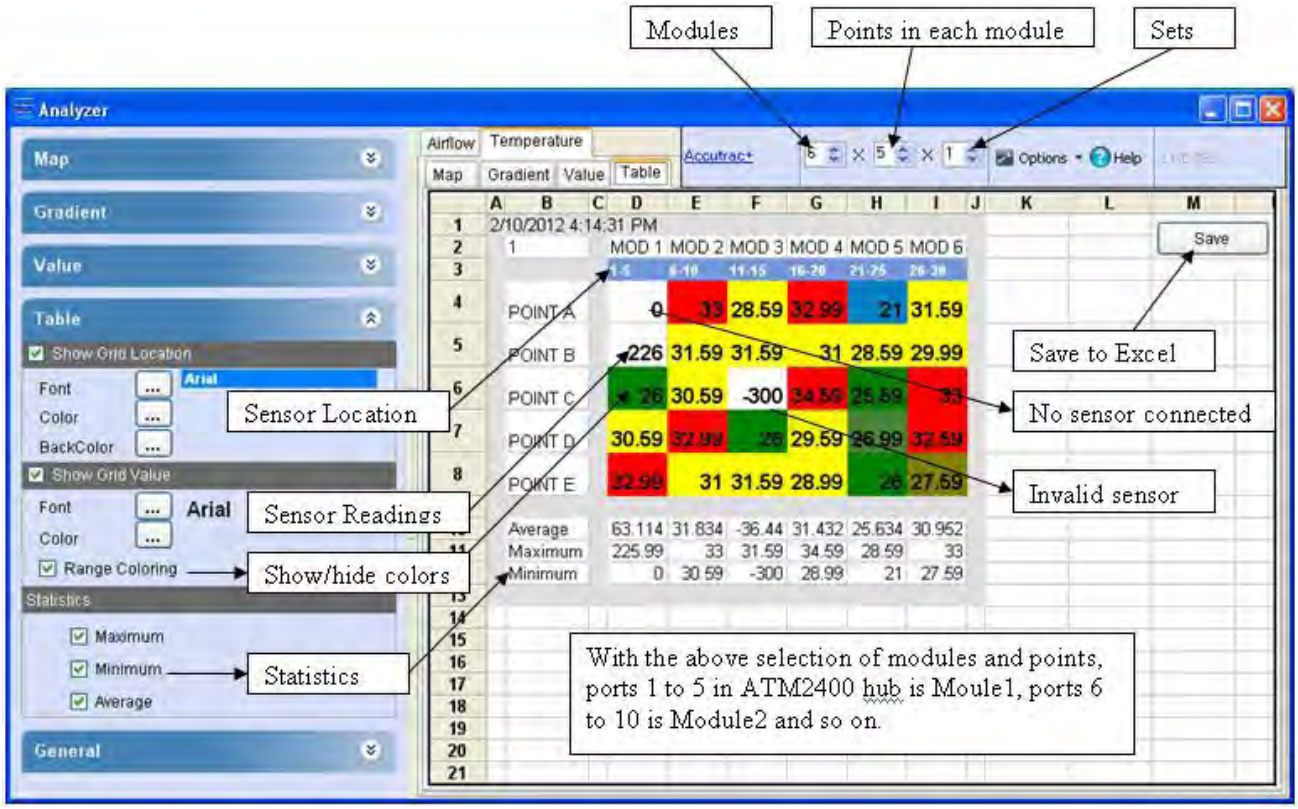


You can select different chart-types and can export the chart to different image formats.



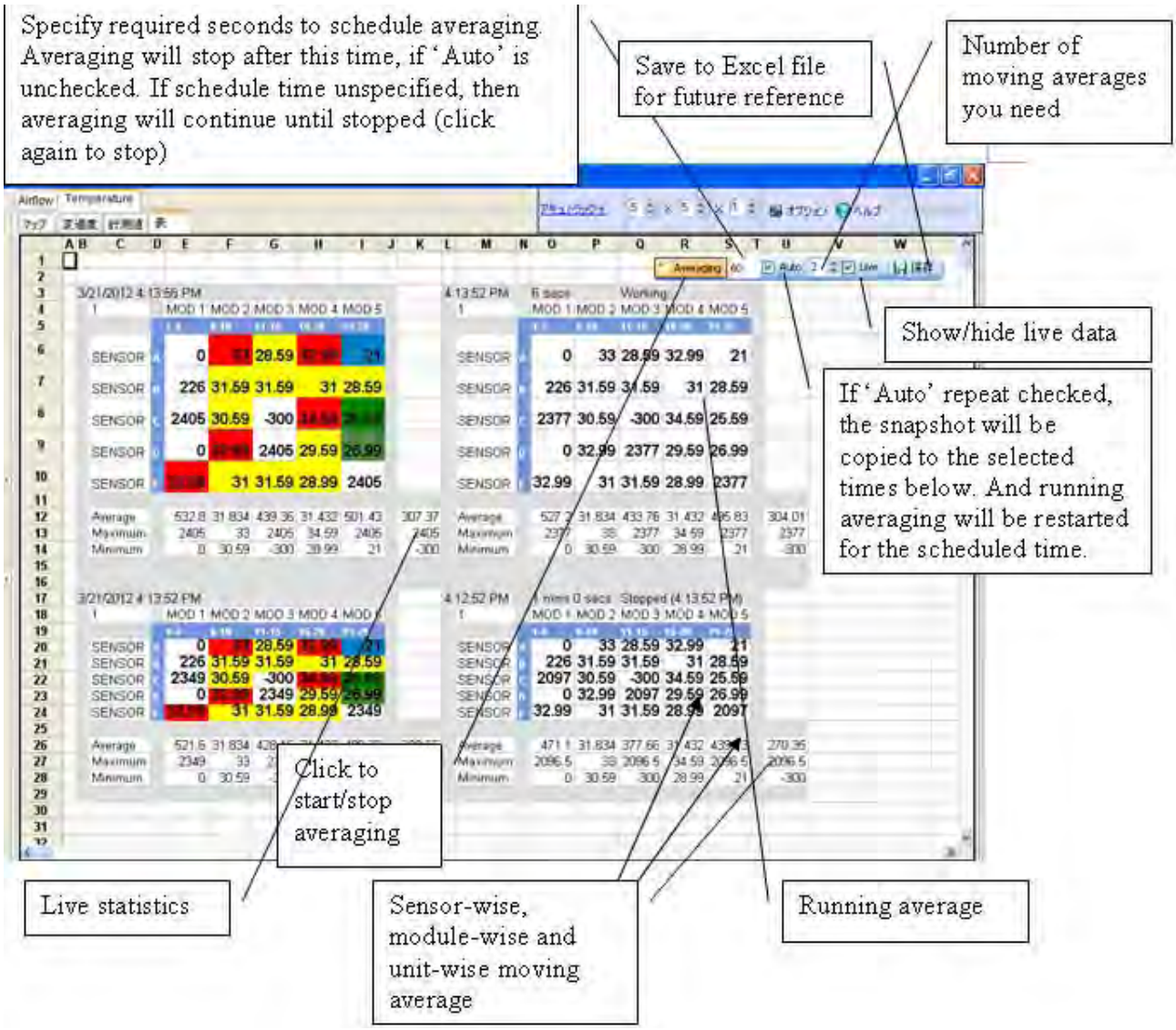
Table

Table tab displays sensors grouped into modules and can be used to compute subgroup statistics. Also individual and group readings can be averaged for the user-specified period of time.



Averaging

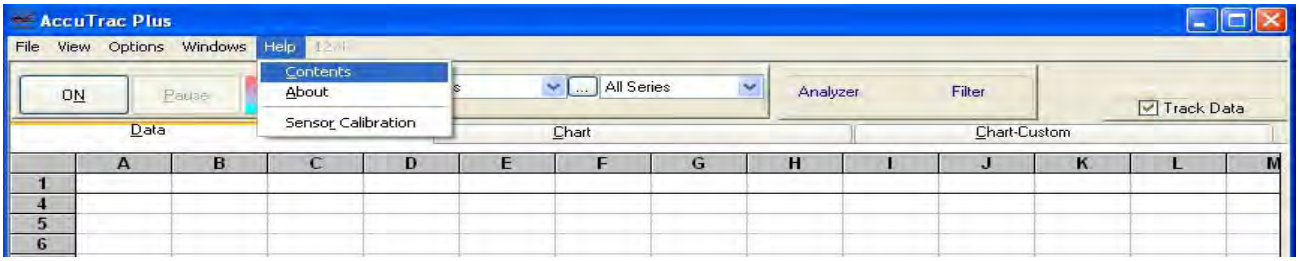
- Table tab can be used to analyze the readings average over a period of time, sensor-wise, module-wise, or unit-wise.
- Click on the 'Averaging' button to start/stop the averaging process.
- If you haven't specified any schedule-time, the averaging will continue until you stop the averaging process, by clicking the button again.
- If you have to analyze average for last 5 minutes, minute-wise, then type 60 (seconds) in schedule time, and 5 in the snapshots dropdown. Last 5 snapshots of readings with calculated averages will be continously shown below the live matrix.
- You can save the calculated averages to an Excel file.


Specify required seconds to schedule averaging. Averaging will stop after this time, if 'Auto' is unchecked. If schedule time unspecified, then averaging will continue until stopped (click again to stop)
Save to Excel file for future reference
Number of moving averages you need
Show/hide live data
If 'Auto' repeat checked, the snapshot will be copied to the selected times below. And running averaging will be restarted for the scheduled time.
Click to start/stop averaging
Live statistics
Sensor-wise, module-wise and unit-wise moving average
Running average

NOTE: Select 'Show Layout' in General tab to display the module and sensor information.

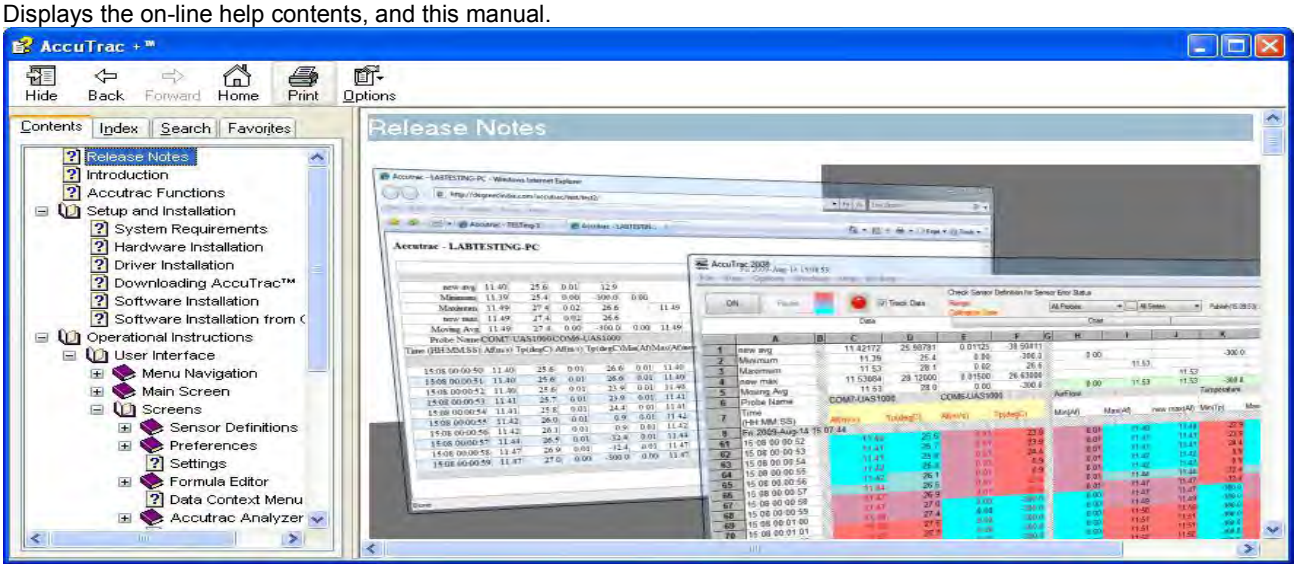
8.15 Help Menu

AccuTrac help for each screen is available on pressing F1 key on that screen.



- Contents

Displays the on-line help contents, and this manual.



- About

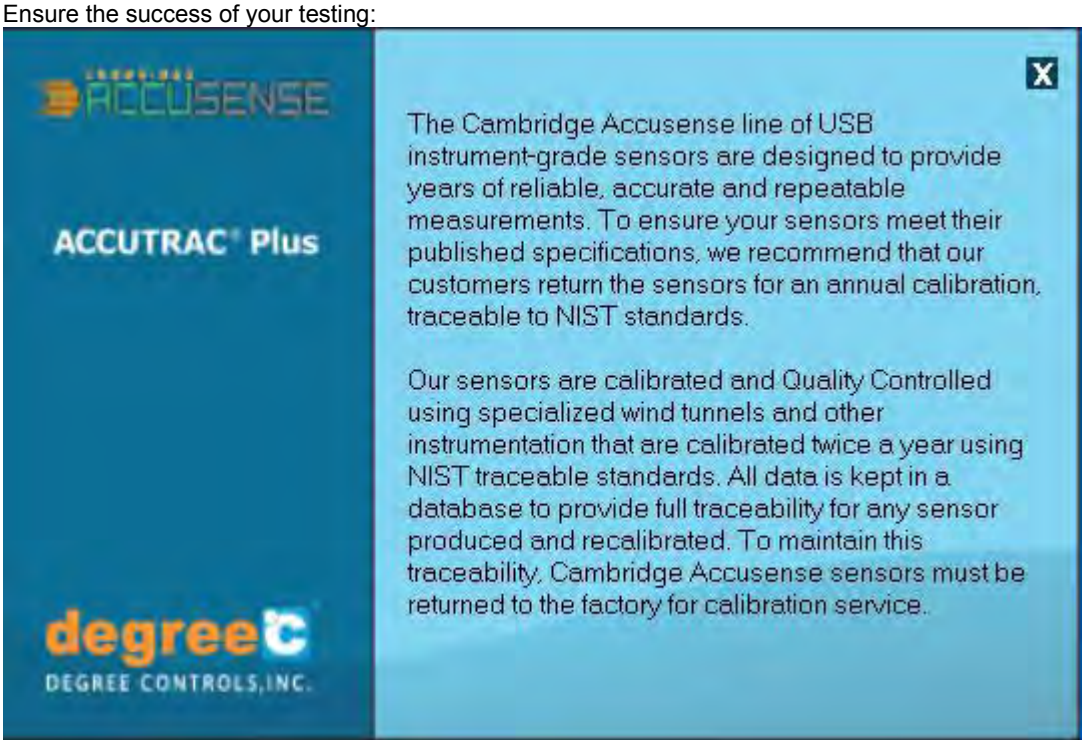
Displays version and release information for Accutrac® software.

- Calibration Reporting

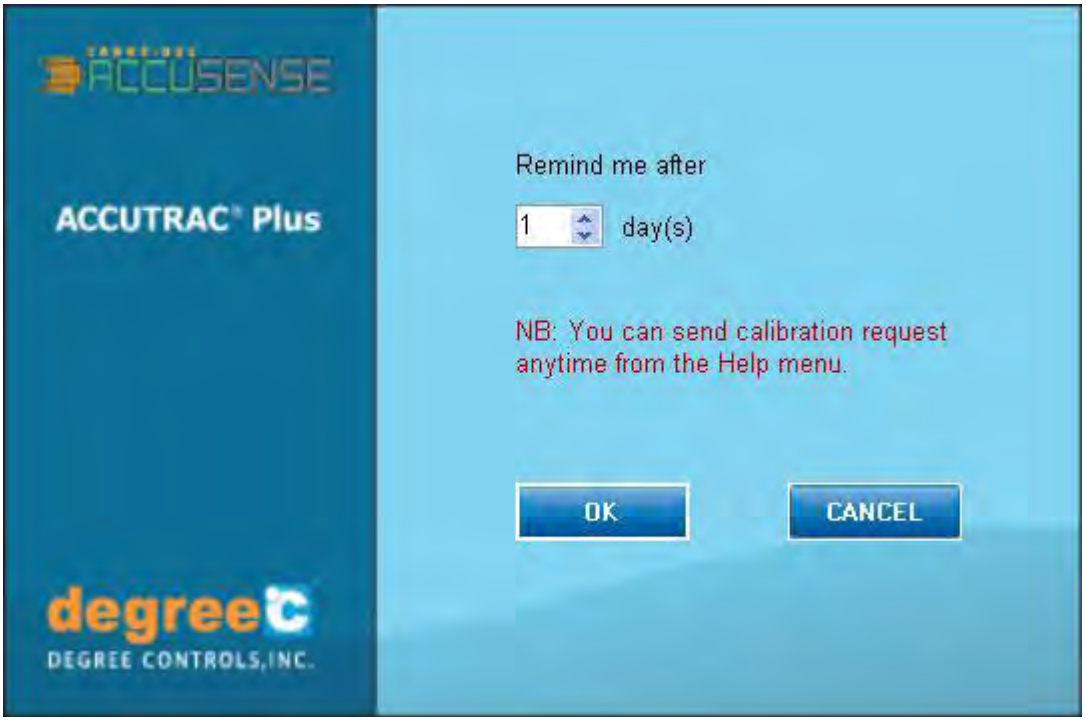
Facility to report (through email) the list of sensors that exceeded internally set calibration dates. Calibration reporting enable the user to send the list of sensors that need calibration. If the user is not opted to hide (or to remind later), he is prompted to send the report when a sensor is about to be used for data collection.
On starting the data collection, if any of the sensors exceeded calibration date, the following screens will appear.
You can start a reporting from Help menu too, anytime when some sensors are connected.

1. Welcome Screen

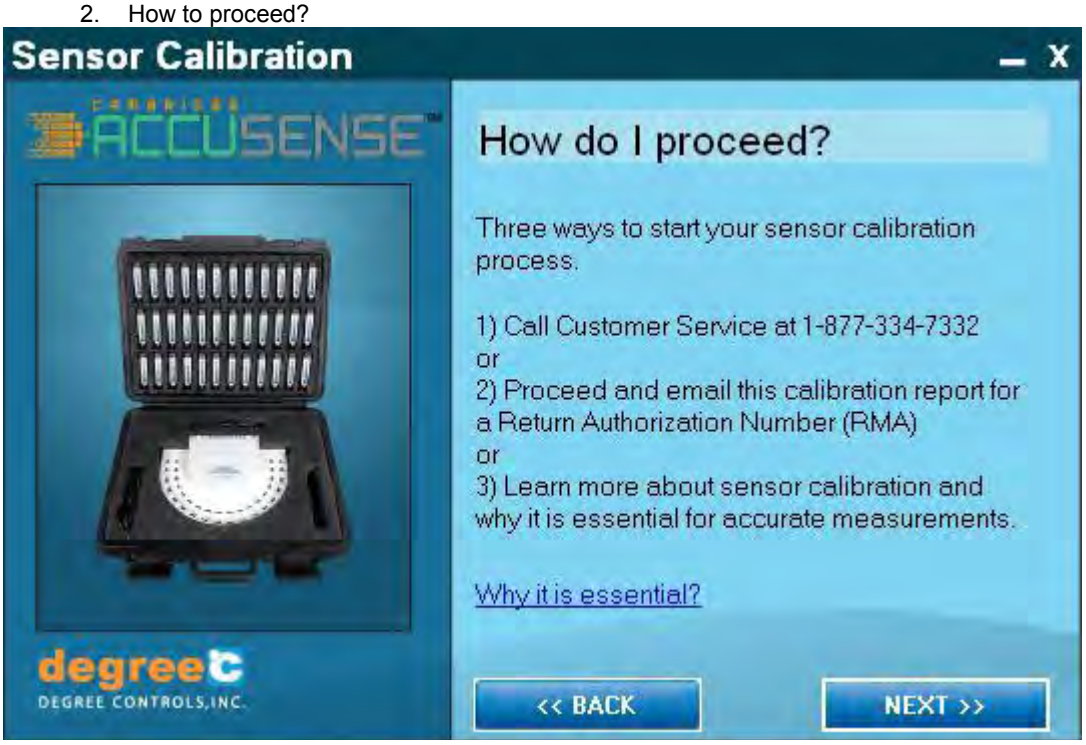
Ensure the success of your testing:


ACCUSENSE
ACCUTRAC® Plus
The Cambridge Accusense line of USB instrument-grade sensors are designed to provide years of reliable, accurate and repeatable measurements. To ensure your sensors meet their published specifications, we recommend that our customers return the sensors for an annual calibration, traceable to NIST standards.
Our sensors are calibrated and Quality Controlled using specialized wind tunnels and other instrumentation that are calibrated twice a year using NIST traceable standards. All data is kept in a database to provide full traceability for any sensor produced and recalibrated. To maintain this traceability, Cambridge Accusense sensors must be returned to the factory for calibration service.
degreeC
DEGREE CONTROLS,INC.

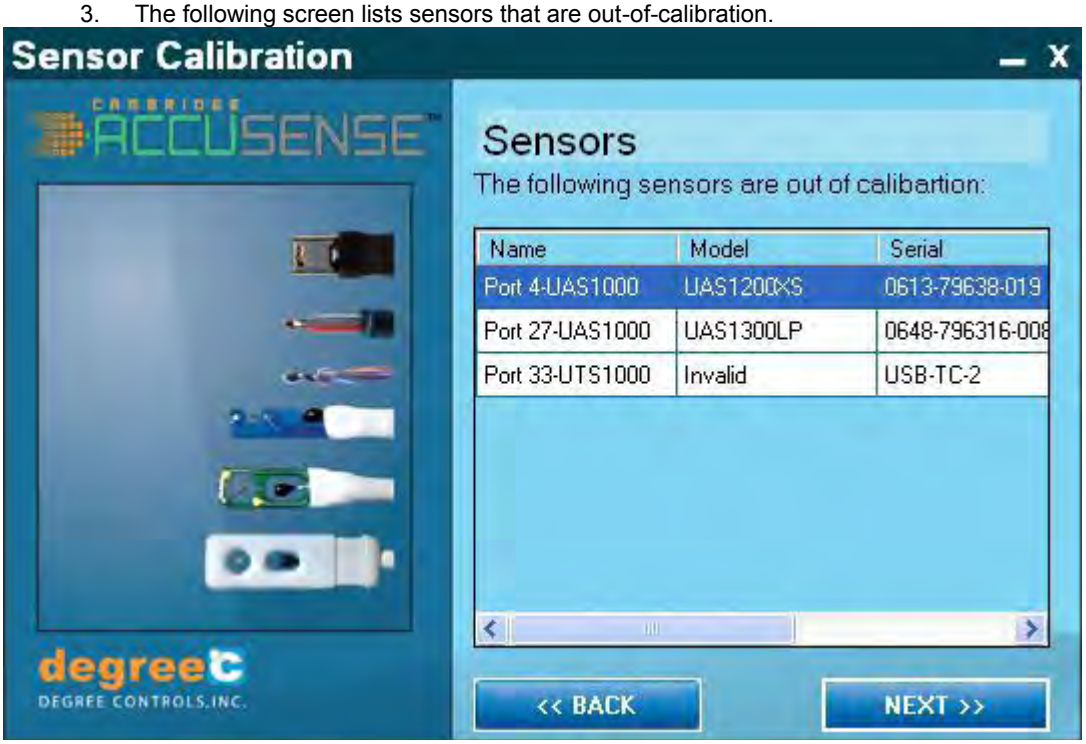
Remind me Later:



2. How to proceed?


Sensor Calibration
ACCUSENSE
How do I proceed?
Three ways to start your sensor calibration process.
1) Call Customer Service at 1-877-334-7332
or
2) Proceed and email this calibration report for a Return Authorization Number (RMA)
or
3) Learn more about sensor calibration and why it is essential for accurate measurements.
Why it is essential?
<< BACK
NEXT >>
degreeC
DEGREE CONTROLS,INC.

3. The following screen lists sensors that are out-of-calibration.



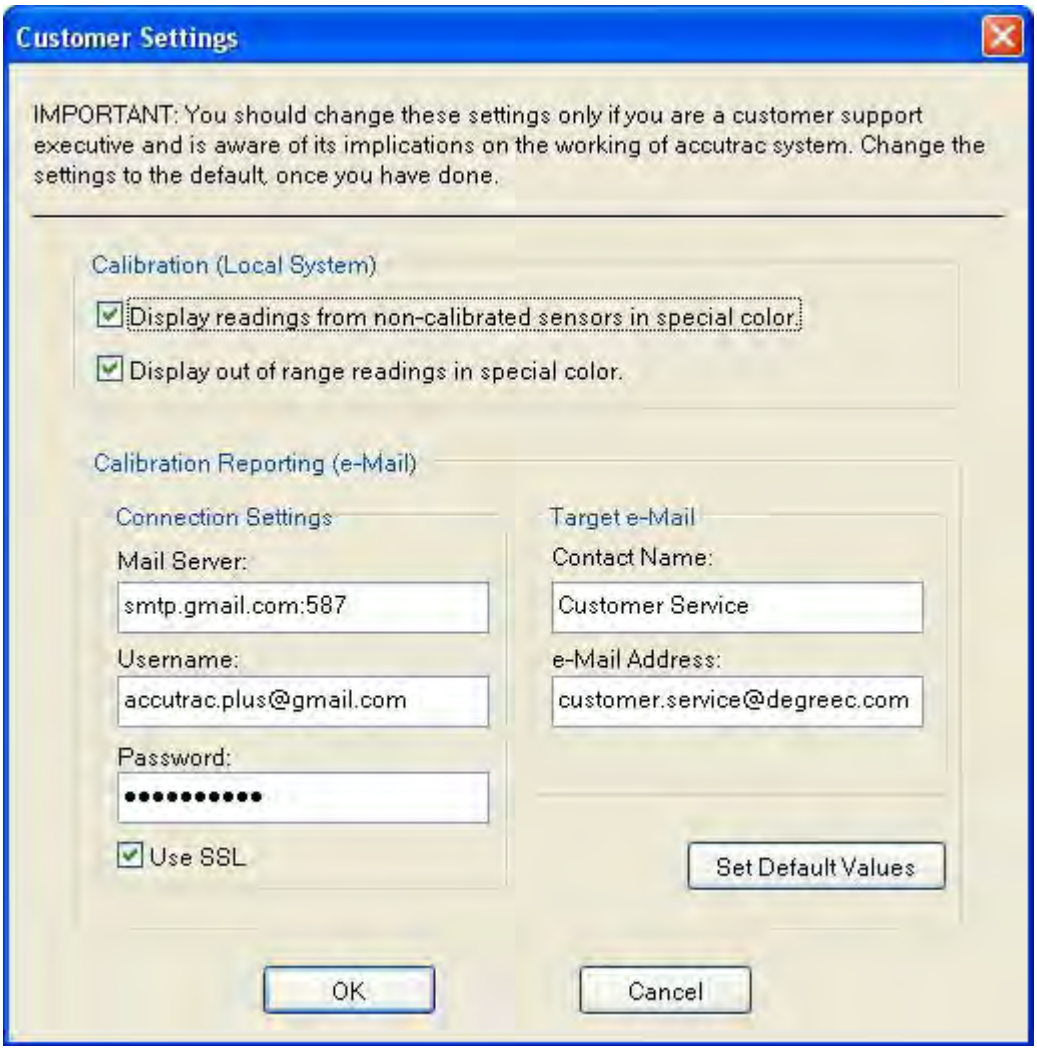
NOTE: The last column has the reported date, if the sensor is already reported for calibration earlier.

4. Send the email.

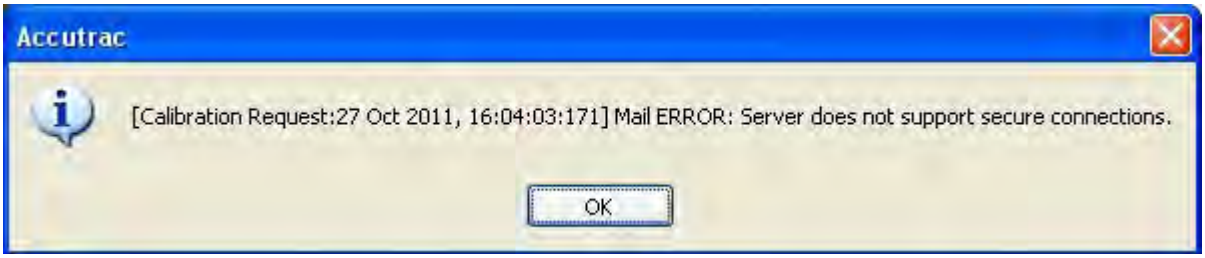
To change the reporting and calibration display settings, press Alt A (since it is hidden) in Accutrac® to get the following screen and give the password: deg.sup.1 (demo password may change later).

Customer Support
IMPORTANT: You should change these settings only if you are a customer support executive and is aware of its implications on the working of accutrac system. Change the settings to the default, once you have done.
Support Password:
OK
Cancel

Then you will get the next screen, where you can change the receiving email address etc. Currently mails are sent to customer.service@degreec.com. You are free to change this address.


Customer Settings
IMPORTANT: You should change these settings only if you are a customer support executive and is aware of its implications on the working of accutrac system. Change the settings to the default, once you have done.
Calibration (Local System)
Display readings from non-calibrated sensors in special color.
Display out of range readings in special color.
Calibration Reporting (e-Mail)
Connection Settings
Mail Server:
smtp.gmail.com:587
Username:
accutrac.plus@gmail.com
Password:
Use SSL
Target e-Mail
Contact Name:
Customer Service
e-Mail Address:
customer.service@degreec.com
Set Default Values
OK
Cancel

Troubleshooting: If you get an error like the one following, uncheck the 'Use SSL' box.



Troubleshooting: If you get an error like the one following, use another 'Mail Server'.

Accutrac
[Calibration Request:27 Oct 2011, 16:01:10:296] Mail ERROR: Transaction failed. The server response was: 5.7.1 Service unavailable; Client host [122.181.174.157] blocked using zen.spamhaus.org; http://www.spamhaus.org/query/bl?ip=122.181.174.157
OK

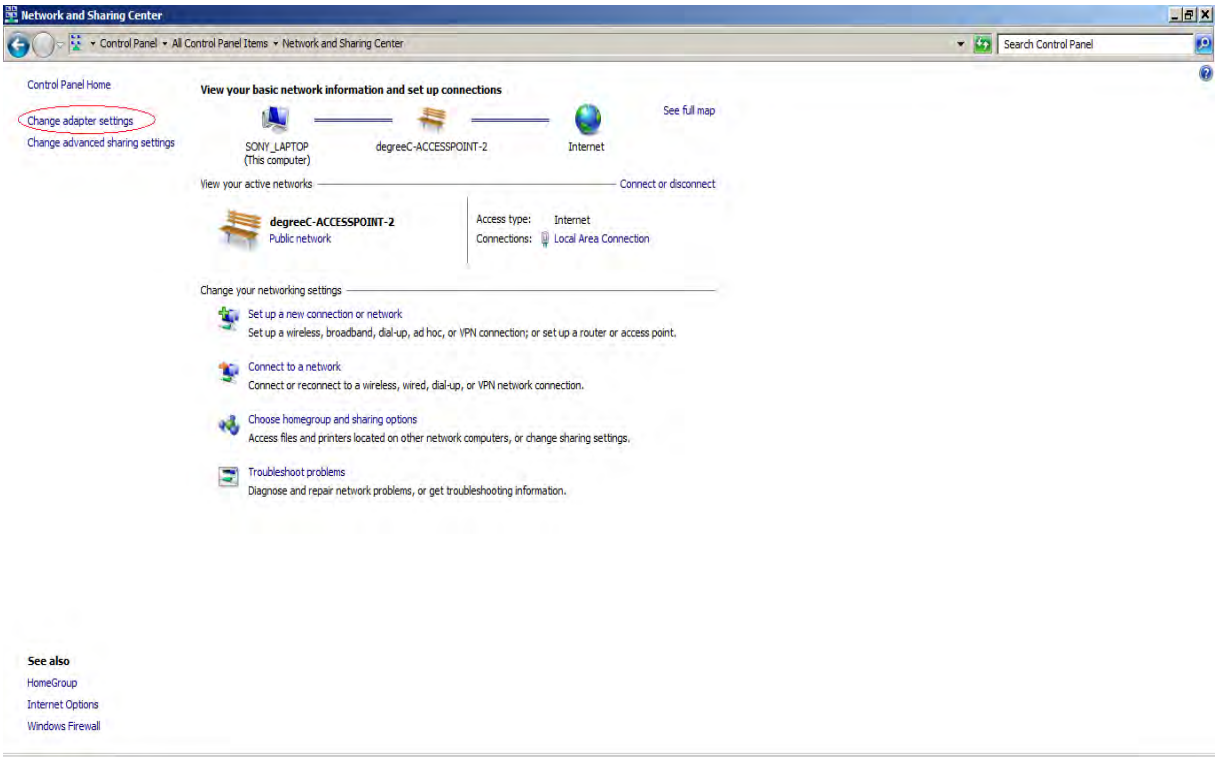
9. ATM2400 USB to Ethernet Adapter

Fixed IP Address Model

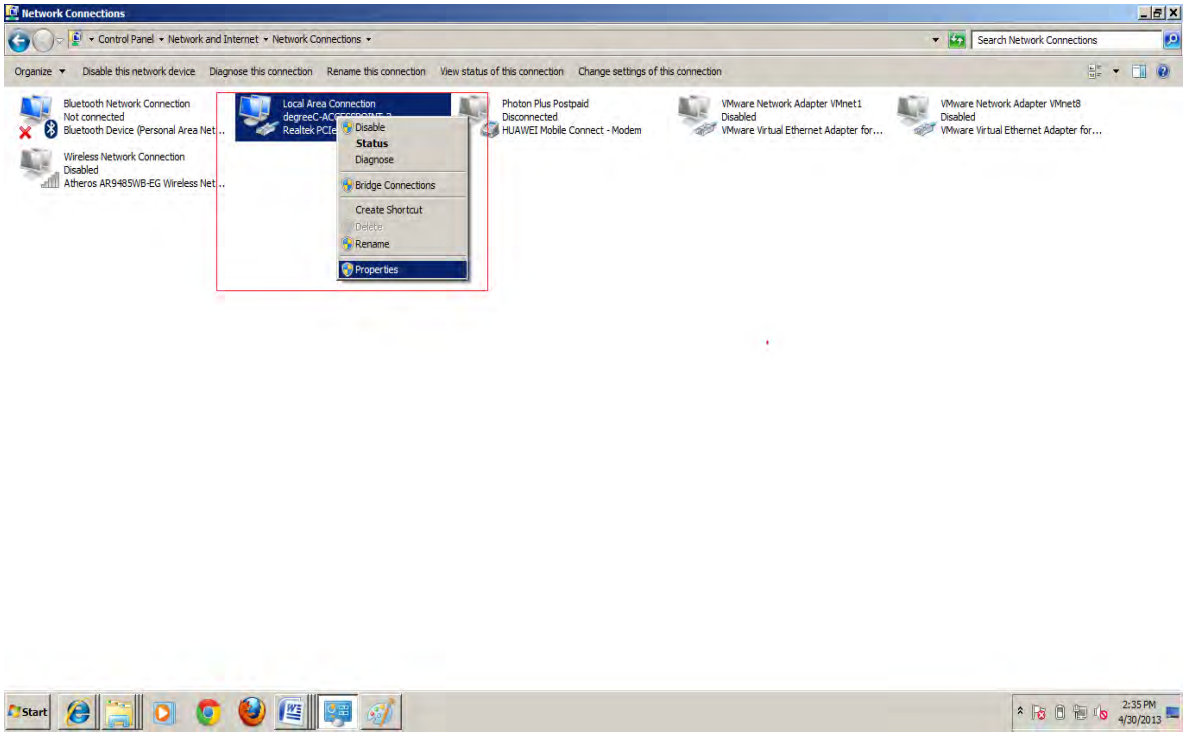
The ATM2400 USB to Ethernet adapter provides an optimized means to reliably connect Cambridge Accusense USB sensors to any Windows computer for data acquisition. The use of standard CAT-5 or better Ethernet cable allows the ATM2400 hub to be located up to 100meters from the host computer before an active repeater is required.

To use the fixed IP address model of the ATM2400 USB to Ethernet adapter, connect the Ethernet cable directly from the adapter to the host computers RJ45 wired LAN connector.

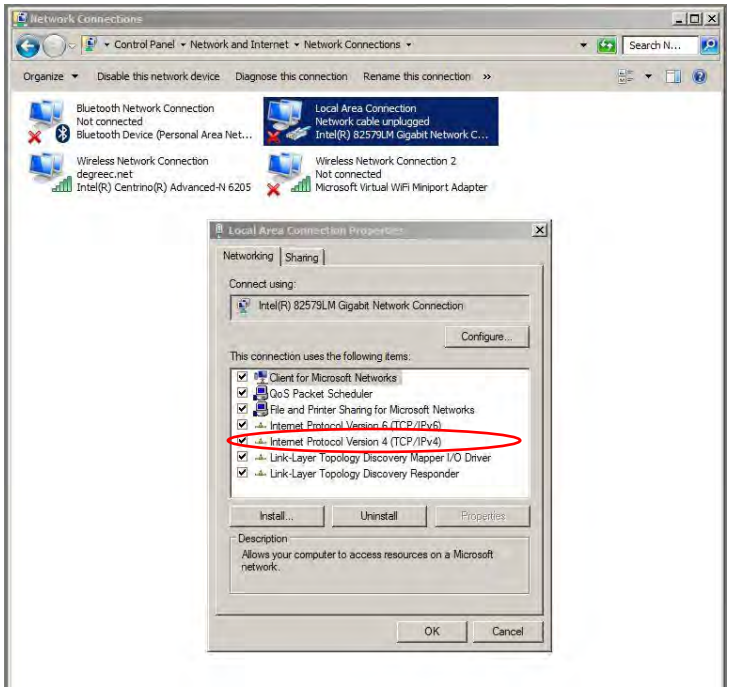
1) **Host Windows computer wired LAN configuration.**
   a. Open the Network control panel
   b. Select Change adapter settings


Network and Sharing Center
Control Panel ▸ All Control Panel Items ▸ Network and Sharing Center
Search Control Panel
Control Panel Home
Change adapter settings
Change advanced sharing settings
View your basic network information and set up connections
See full map
SONY_LAPTOP
(This computer)
degreeC-ACCESSPOINT-2
Internet
View your active networks
Connect or disconnect
degreeC-ACCESSPOINT-2
Public network
Access type: Internet
Connections: Local Area Connection
Change your networking settings
Set up a new connection or network
Set up a wireless, broadband, dial-up, ad hoc, or VPN connection; or set up a router or access point.
Connect to a network
Connect or reconnect to a wireless, wired, dial-up, or VPN network connection.
Choose homegroup and sharing options
Access files and printers located on other network computers, or change sharing settings.
Troubleshoot problems
Diagnose and repair network problems, or get troubleshooting information.
See also
HomeGroup
Internet Options
Windows Firewall

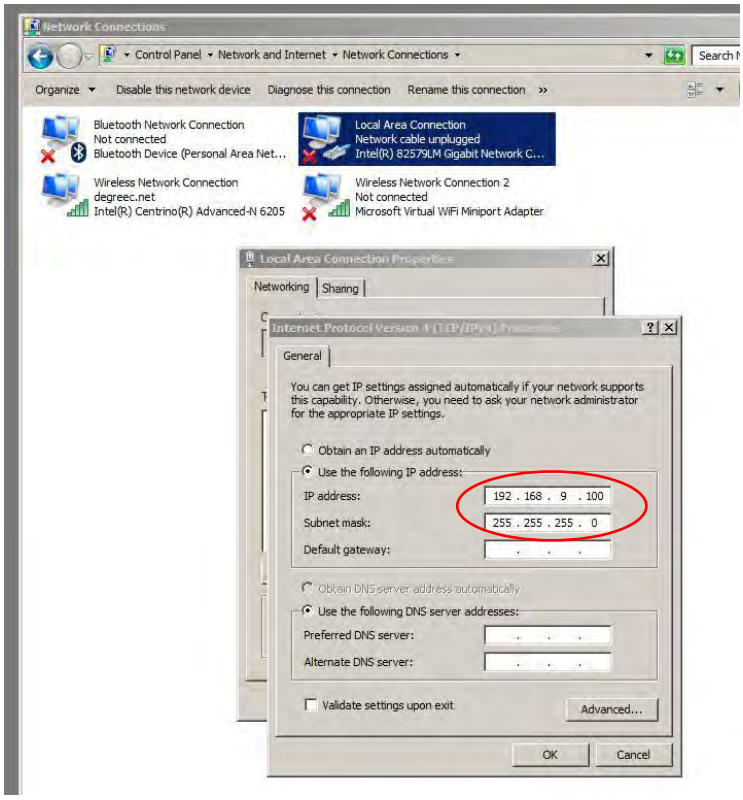
c. Select the proeprties of Local Area Connection



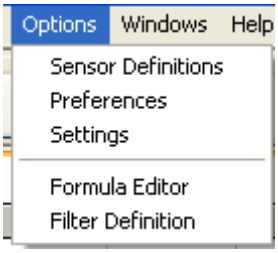
d. In the Networking tab, double click the Internet Protocol Version 4 (TCP/IPv4)



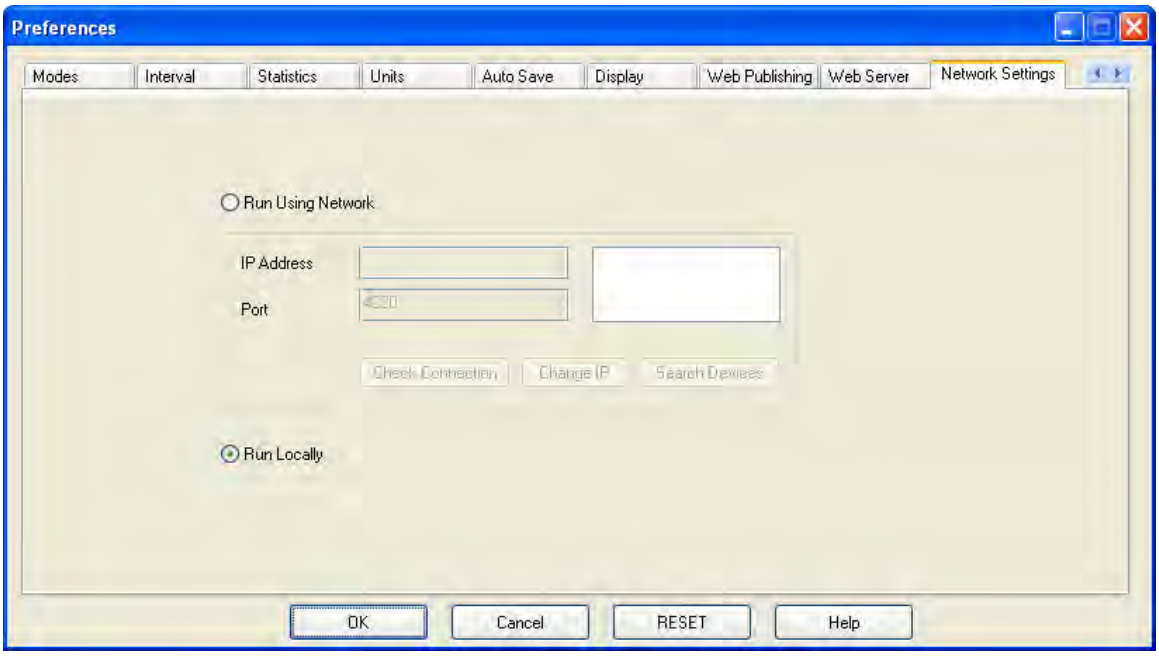
e. Select Use the following IP address button, and then enter the IP address found on the bottom label of the ATM2400 USB to Ethernet adapter housing, for the last three numbers, choose a value that is close to but not the same as the adapter module. For the Subnet mask, use 255.255.255.0


Network Connections
Control Panel ▸ Network and Internet ▸ Network Connections
Organize
Disable this network device
Diagnose this connection
Rename this connection
Bluetooth Network Connection
Not connected
Bluetooth Device (Personal Area Net...
Local Area Connection
Network cable unplugged
Intel(R) 82579LM Gigabit Network C...
Wireless Network Connection
degreec.net
Intel(R) Centrino(R) Advanced-N 6205
Wireless Network Connection 2
Not connected
Microsoft Virtual WiFi Miniport Adapter
Local Area Connection Properties
Networking
Sharing
Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
192 . 168 . 9 . 100
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

2) Take the OPTION menu, from that select the preference option.



3) Choose Network tab from preference dialog.



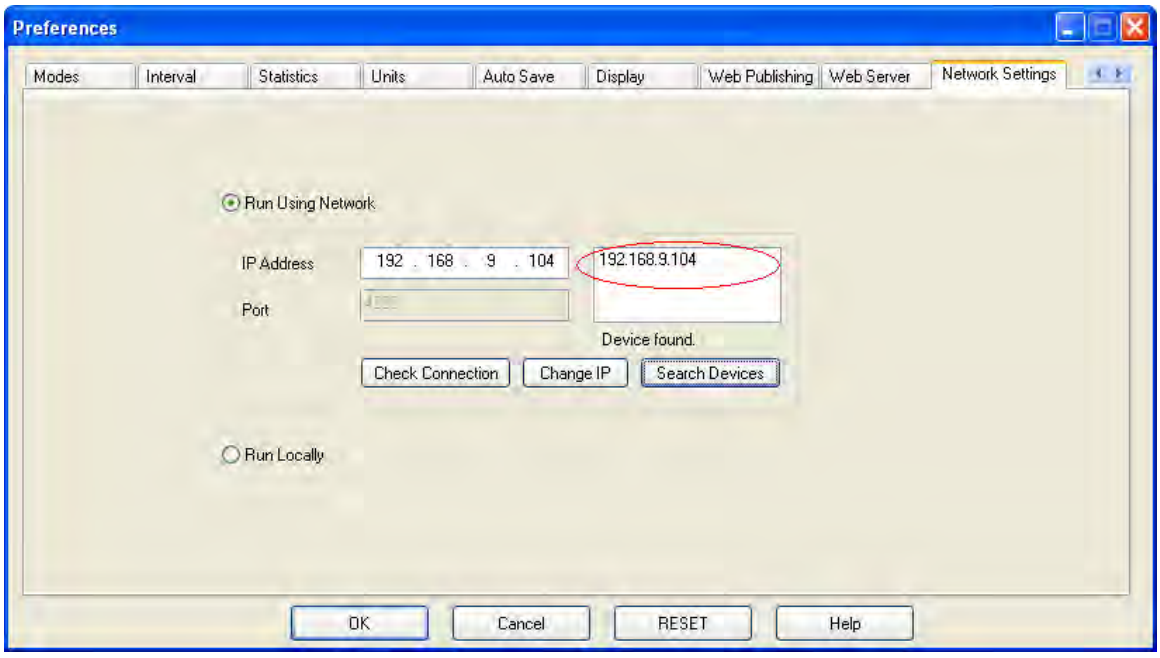
a) There is two option in the preference dialog

a) Run Locally -: This option is to run the application normally (without using USB to Ethernet Adapter option.).

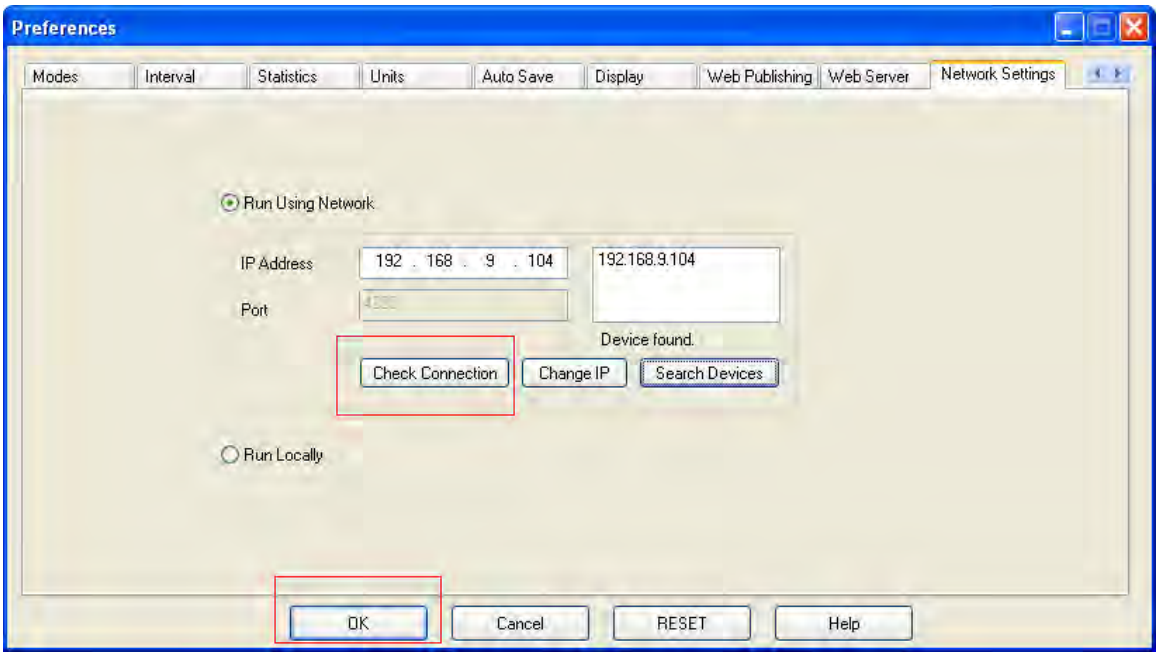
b) Run Using Network -: This option helps to run the application using USB to Ethernet Adapter option.

b) Type IP address of USB to Ethernet Adapter device or you can search the devices by clicking “Search Devices” button. Default IP is 192.168.9.104. You can the default IP by Clicking “Change IP” button. When change IP option is clicked a new dialog will popup, enter the new IP address and subnet mask and then click “Assign” button. Please wait for the device to restart and connect with new IP. There is also an option to assign the IP address automatically in the New IP Address dialog.

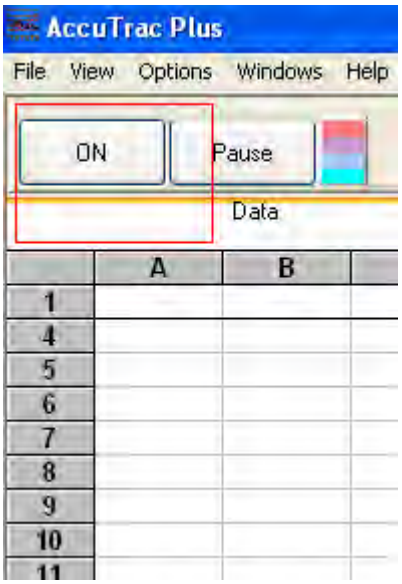
4) Click on "Search Devices" button to search the Accutrac USB to Ethernet Adapter devices that connected to the same router. The IP address of USB to Ethernet Adapter devices will be displayed in the list box. Select the IP address from the list box to connect to the device.



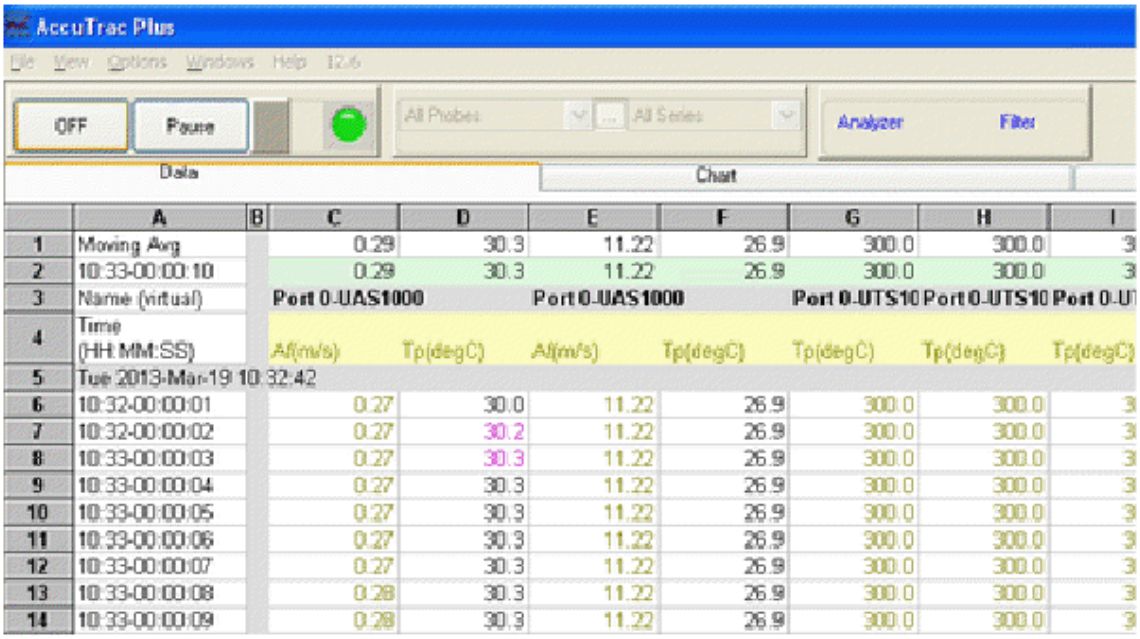
5) Click "Check Connection" button to check the network connection. Click on "OK" button after completing the network configuration.



6) Click “On” button from main window.



7) Please wait for a while to start the data transfer



10. Maintenance & Troubleshooting

Before calling Degree Controls, Inc. for service, you may find answers to your questions in this Manual, or on the Degree Controls, Inc. web site.

Are you using the latest software version?
Did you try restarting the instrument, computer, and software?
Visit Degree Controls, Inc."s website for latest information on the unit, firmware upgrades, and FAQ.

Contact Degree Controls, Inc. Tech Support if you were unable to find answers to your questions above.

10.1 Frequently Asked Questions

Q: Do the ATM2400 and Software indicate when the airflow exceeds the calibration range of the UAS sensor being used?

A: The user must compare the readings with the calibration range of the sensors (marked on sensor) and make sure it stays within range.

Q: Can I connect UAS sensors with different calibration ranges at the same time?

A: Yes. The ATM2400 has the capability of detecting each UAS sensor"s calibration information automatically, which is used when calculating readings.

Q: What can you tell me about the accuracy of the UAS sensors beyond the calibration range?

A: Degree Controls, Inc. specifies the accuracy of each UAS sensor within the defined calibration range, marked on each sensor"s connector. At higher velocities the sensors tend to underread, at velocities below the range readings should not be considered accurate. Velocities below 30 FPM result in convection at the heated sensor and should not be considered accurate.

Q: Are there any limitations or prohibitions against using the instrument and sensors in noisy environments, such as close to power supplies?

A: Research to date on the influence of noisy environments has found little sensitivity to EMI radiation.

Q: Does dust affect the readings?

A: As long as the UAS sensor head is not heavily covered or blocked with dust, the readings should still be accurate.

Q: What does it mean when Accutrac reports that the data buffer is full?

A: Accutrac"s data space is full. Save your current spreadsheet, and begin a new data run.

Q: What do I do when I get an error message in Windows saying that the Cambridge Accusense ATM2400 Sensor Device has exceeded the current limit of it's hub port?

A: Turn off the ATM2400, and shut down Accutrac. Turn the ATM2400 hub back on, and restart Accutrac.

Q: How about chemicals or other gases in the air?

A: There are two issues worth noting:

Hazardous chemicals like acids might damage the UAS sensor.
UAS sensors are calibrated for air in human environments only (room air), so the readings may be inaccurate in other environments.

Q: How can I clean a dusty UAS sensor?

A: Use an ultrasonic bath for cleaning UAS sensor heads. Be sure to unplug the sensor before cleaning!

Q: My application requires measurements above 70°C (158°F).

A: The UAS sensor itself should not be damaged when used below 100°C (212°F). But measurement outside the sensor"s temperature calibration range may cause the reading to be less accurate.

10.2 Maintenance Procedures

Degree Controls, Inc. guarantees the calibration of the ATM2400 Series instruments and the sensors for one (1) year starting the day of delivery.

10.2.1 Recalibration

To ensure that your ATM2400 always gives the most accurate readings, Degree Controls, Inc. recommends that the sensors be recalibrated once every year.

To recalibrate, contact Degree Controls, Inc. for an RMA-number and shipping instructions before returning the unit.

To check if a UAS sensor is still accurate, compare the readings to a sensor of the same type and location/flow. Ensure that the air velocity matches the sensor"s calibration range.

WARNING: THERE ARE NO CUSTOMER SERVICEABLE PARTS INSIDE THE ATM2400, UAS, or UTS SENSORS. OPENING THE CASE AFFECTS THE DEGREE CONTROLS, INC. WARRANTY AND RISKS ELECTRIC SHOCK!

10.2.2 Cleaning

To clean a unit or its cables, use a mild detergent applied to a clean cloth.

Do not use alcohol or ammonia based solutions.

To clean the sensor-heads, use an ultrasonic bath.

CAUTION: Unplug the sensor before putting it into the ultrasonic bath.

11. ADDENDUM A: CE Mark / TUV Certificate of Conformity

Certificate of Conformity
According to EN 45014

IQS, a Division of Degree Controls, Declares that the product:

Models: ATM2400 W/ UAS1000 AND UTS1000 Series

Product Type: USB Hub with Airflow and Temperature sensors

Manufacturer: Degree Controls Inc.

Conforms to the appropriate country standards and governing regulations listed below for a non-continuous operating product deployed in a controlled EM environment through successful testing to these standards. The manufacturer is fully responsible for the design and production of the above-mentioned equipment to continually meet these requirements.

Emissions:
EN 55011, CISPR11 Class A.

Immunity:
EN61326 "Electrical equipment for measurement, control and laboratory use EMC requirements"

EN61000-4-2 "Electromagnetic compatibility – Electrostatic discharge immunity test".

EN61000-4-3 "Electromagnetic compatibility – Radiated, radio frequency electromagnetic field immunity".

EN61000-4-4 "Electromagnetic compatibility – Electrical fast transient/burst test".

EN61000-4-5 "Electromagnetic compatibility – Surge immunity test".

EN61000-4-6 "Electromagnetic compatibility – Immunity to conducted disturbances"

EN61000-4-11 "Electromagnetic compatibility – Voltage dips and interruptions"

Place: Marlboro, MA Date: March 15, 2006

CE

TÜV PRODUCT SERVICE NRTL C US